OPERATION OF THE COAL THAWING SYSTEM
INTERMOUNTAIN GENERATING STATION, UNITS 1 AND 2

Project Modification No. 198
Work Order No. PBQ70

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I. Background

For years, the Car Thawing System (CTS) of the Intermountain Generating Station (IGS) was not operated as originally designed to operate. The Union Pacific Railroad Company (UP), the operator of the locomotives, required that the locomotives cleared the entire thaw shed, not each station of the heaters as originally designed, before the heaters were allowed to be energized. This requirement causes an inefficiency in the CTS operation, especially during severe weather conditions.

In 1991, a test program was conducted to determine the temperature profile at various points of a loaded coal car under the UP required operating conditions. However, the test results are not considered to be conclusive due to the lack of sufficient data. We have included the recorded test data as an appendix in this report.

On January 17, 1992, UP agreed to implement the originally designed operating procedures as long as the locomotives are not exposed to the energized heaters. This operating procedure enhances the thawing efficiency and makes the thaw shed operation more flexible.

Even with the new operating procedures, there are still many variables which can affect thawing efficiency. A list of the variables follows:

1. Water content in the coal,
2. Train speed,
3. Shape of the coal car,
4. Heater power setting,
5. Ambient temperature,
6. Operating procedure,
7. Frozen coal thickness,
8. Heater arrangement,
9. CTS ventilation,
10. Quantity of fines in the coal.

Because of the complexity of the CTS, a few assumptions are made to simplify the evaluation of the thaw shed operation. Such as, the water content in the coal is assumed to be 5% which is typical for Utah coal. The train speed is also assumed to be constant which may not be always true at the very low speed of 0.3 to 0.6 MPH. Other assumptions will be given in this report whenever necessary.

The purpose of this report is to evaluate the current operating procedure and recommend the optimum heater arrangement and operating method.

II. Heat Input

The total power supply to the CTS is 9960kw. When the train moves through the thaw shed at the speed of 0.3MPH, the duration the coal car is exposed to the heaters is approximately 15 minutes. Under the most ideal conditions (without any heat loss, 100% power setting, and complete absorption of the heat energy), the total heat available for thawing is 2515kwh or 8,560,000 Btu. This amount of heat can melt about 30 tons of ice at 32 deg F in this 15 minute period.

For the typical Utah coal with 5% water content, the amount of ice formed inside the 7 coal cars may be 35 tons. Therefore, even under the most ideal conditions, the CTS can not provide enough heat to completely melt the frozen coal. The purpose of the thaw shed is to break the bond between the frozen coal and the coal car,and then partially melt the the frozen coal. The icy coal can never be thawed completely under severe weather conditions.

III. Thaw Shed Design

The size of the thaw shed is approximately 400 ft long, 25 ft high and 25 ft wide. A total of 206 electric infrared heaters are distributed in seven stations. There are more heaters located in the first two stations and gradually less heaters in Stations 3 through 7. The following is a table showing the current heater arrangement:

	No. of Heaters		Total Power
	Bottom	Sides	
Station 1 :	20 - 60kw	20 - 60kw	2400kw
Station 2:	20 - 60kw	20 - 60kw	2400kw
Station 3:	20 - 60kw	20 - 30kw	1800kw
Station 4:	6 - 60kw	20 - 30kw	960kw
Station 5:	6 - 60kw	20 - 30kw	960kw
Station 6:	6 - 60kw	20 - 30kw	960kw
Station 7:	8 - 60kw	None	480kw

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It is the industrial-wide practice to design the thaw shed with soaking stations, in which no heaters are located, following the heating stations. The purpose of the soaking stations is to allow the heat to penetrate into the frozen coal for effective thawing. The IGS thaw shed does not currently provide soaking stations. According to Johnson March Systems, Inc., the designer of the IGS thaw shed, the heaters are arranged to heat the cars to their maximum capacity in the beginning of the shed, and then gradually to decrease the heating towards the end of the shed. This arrangement allows only a limited soaking effect at the end. To correct this design defficiency, they suggest extending the thaw shed to provide 3 car stations for soaking only (without heaters). Because of the space limitation and the associated cost, this suggestion is not very practical.

IV. Heat Required for Thawing

To evaluate the heater arrangement in the thaw shed, a fundamental question must be answered: How much heat is required to thaw a coal car full of frozen coal? Our first step is, thus, to find out the heat requirement for each coal car under different operating conditions.

Assumptions

The heat required to thaw frozen coal depends on three major factors: (1) the coal car geometry, (2) the ambient temperature, (3) the amount of ice to be melted. Accordingly, the following assumptions are made in our calculations:

1. The heater arrangement can be generally divided into three areas; at the bottom, at the left side, and at the right side. In responding to this heater arrangement, the coal car is also divided into three parts to be exposed to these heaters.

2. The ambient temperatures are assumed in the range from -30 deg F to 32 deg F, which can cover the severe winter weather up to barely frozen conditions.

3. The thickness of the frozen coal is assumed to range from 1 inch to 12 inches. This represents the conditions from just breaking the bond of the frozen coal to thawing a fair amount of coal for dumping.

In addition to the above assumptions, the following basic data are used in our calculations:

Density of Aluminum = 165.6 Lb/ Cu. Ft
Specific heat of Aluminum = 0.217 Btu / Lb - Deg F
Density of Ice = 56 Lb / Cu. Ft
Specific Heat of Ice = 0.487 Btu / Lb - Deg F
Latent Heat of Fusion = 144 Btu / Lb of ice

The Results

Table 1 presents the theoretical results of the calculated heat requirement for each coal car of 100 tons of coal. The heat can vary from 64.74 kwh to as high as 267.9kwh. The highest heat requirement is very close to the emperical design requirement of 3.0 kwh per ton of coal, as suggested by Johnson March Systems, Inc.

Table 1. Total Heat Requirement For Each Coal Car At Various Conditions

	Total Heat Required Kwh				
Ambient Temperature Deg F	1 - inch ice	3 - inch ice	6 - inch ice	9 - inch ice	12 - inch ice
32	64.74	92.02	132.9	173.8	214.9
20	68.91	97.31	139.9	182.5	225.1
10	72.42	101.7	145.7	189.7	233.7
0	75.91	106.2	151.5	196.9	242.2
-10	79.42	110.6	157.3	204.1	250.8
-20	82.94	115.0	163.1	211.3	259.4
-30	86.42	119.4	168.9	218.4	267.9

Industry experience indicates undercar-heat is more esential than side-heat since the car hoppers are more exposed to weather than the car body. Experience at IGS has shown frozen coal at the bottom and front and rear side slopes of the cars is the most difficult to thaw. Therefore, in our case study to be presented later, we have more heating power (in terms of kw/sq ft) for the bottom heaters than the side heaters.

V. Heater Arrangements

To evaluate the heater arrangement, we selected the following guidelines:

1. Each car sees the same amount of heat;

2. Provide each car with adequate heat which matches the heat requirement calculated in Section IV;

3. Each heater station generates approximately the same amount of heat;

4. Use the operating procedure as described below;

5. The power setting is at 70% or more;

6. Make the heater rearrangement as simple as possible;

7. Adjust the power settings to fit into different weather conditions.

8. The heaters should be located so that when the train stops no heater is directly under the car couplers where the rubber air hoses are located.

Among these guidelines, Item 4, the operating procedure, needs to be further described in detailed steps as follows:

1. After entering the thaw shed, the train stops as soon as the locomotive clears the first station,

2. The heaters at the first station are energized and the first coal car is exposed to the heat,

3. After stopping 7 minutes, the train starts to move at the speed of 0.3 MPH,

4. Heaters at each station are energized in sequence as soon as the locomotive clears the station,

5. Heaters at all stations are on after the locomotive passes the last station,

6. Heaters are turned off after all the coal cars pass the thaw shed.

With this operating procedure, only the first car is subjected to static heating of 7 minutes, all the rest are subjected only to moving heating. It should be noted here that the 7 minutes static heating time is only a theoretical value under ideal conditions. In reality, the static heating time should be increased to compensate for the warm-up time for the heaters which is approximately two minutes. As a first trial, we suggest to set the static heating at 9 minutes which might compensate enough for the warm-up time. However, overheating could occur with prolonged static heating.

We have evaluated a number of heater arrangements and selected a few cases for detailed discussion in this report.

Case 1. Existing Heater Arrangement

The existing heating conditions in the thaw shed are:

1. The first car receives the static heating of 5 minutes at the first station,

2. The train moves at the speed of 0.3 MPH,

3. The power settings are 30% for bottom heaters and 60% for side heaters.

4. More heaters are located in the first two stations and then the number of heaters is gradually decreased in the Stations 3 through 7. The first station has five times more heating power than the last station.

Our calculations show that the total heat each car can receive is approximately 147 kwh. In referring to Table 1, this amount of heat can break only approximately three inches ice from the surface under severe weather conditions. This can explain why we still have thawing problems in severe weather even after adopting the new operating procedure approved by UP.

We found that all the cars can see the same amount of heat, except the first car, regardless of how the heaters are arranged. We can make all the coal cars evenly heated by only adjusting the static heating time for the first car.

We also found that the current heater arrangement, which concentrates the heaters at the entrance, causes thermal shock for the coal cars and does not provide adequate time to transfer the heat from the metal surface to the frozen coal. This results in overheating of the coal cars. The operators have to lower the power setting to 30% to avoid the overheating. If we move some of the heaters from the entrance to other stations, the overheating problem can be greatly reduced.

Case 2. Even Out Both the Bottom and the Side Heaters

The heaters are redistributed to allow each station to produce about the same amount of power. The heater arrangement is as follows:

	No. of Heaters		Total Power
	Bottom	Sides	
Station 1	12 - 60kw	12 - 60kw	1440kw
Station 2	12 - 60kw	12 - 60kw	1440kw
Station 3	12 - 60kw	2 - 60kw, 20 - 30kw	1440kw
Station 4	12 - 60kw	2 - 60kw, 20 - 30kw	1440kw
Station 5	12 - 60kw	2 - 60kw, 20 - 30kw	1440kw
Station 6	12 - 60kw	2 - 60kw 20 - 30kw	1440kw
Station 7	10 - 60kw	12 - 60kw	1320kw

The first car has 7 minutes static heating and then the train moves at the speed of 0.3 MPH. The power setting is at 70% for both bottom and side heaters. The increase of the power setting from 30 - 60% to 70% is to enhance the heating efficiency. The IGS Station Operating Procedures for the thaw shed recommend a power setting between 70% and 90%. The redistribution of the heaters can reduce overheating and make the 70% setting possible.

The total heat each car receives is approximately 232.4 kwh, except the first car which receives only static heating. The amount of heat received by the first car depends on the static heating time. In order to receive the same amount of heat of 232.4 kwh, the static heating time should be approximately 7 minutes. The following chart shows the heat received by each car at each station:

The breakdown of Heat Received by Each Car at Different Stations

	Bottom	Sides	Total
Station 1	16.8 kwh	16.8 kwh	33.6 kwh

Station 2	16.8 kwh	16.8 kwh	33.6 kwh
Station 3	16.8 kwh	16.8 kwh	33.6 kwh
Station 4	16.8 kwh	16.8 kwh	33.6 kwh
Station 5	16.8 kwh	16.8 kwh	33.6 kwh
Station 6	16.8 kwh	16.8 kwh	33.6 kwh
Station 7	14.0 kwh	16.8 kwh	30.8 kwh
Total	114.8 kwh (391,810 Btu)	117.6 kwh (401,370 Btu)	232.4 kwh (793,180 Btu)

Comparing the amount of heat received by the car with data listed in Table 1, we see that effective thawing can occur at 0 deg F. Under severe weather conditions, such as -30 deg F, a power setting of 90% may be necessary.

Case 3. Even Out the Bottom Heaters

In this case, we keep the Johnson March's design philosophy, which is to have more heating power at the entrance of the thaw shed, and modify the design by evenly distributing the bottom heaters to avoid overheating. The heater arrangement is shown as follows:

	No. of Heaters		Total Power
	Bottom	Sides	
Station 1	10 - 60kw	20 - 60kw	1800kw
Station 2	10 - 60kw	20 - 60kw	1800kw
Station 3	10 - 60kw	16 - 60kw	1560kw
Station 4	10 - 60kw	20 - 30kw	1200kw

Station 5	10 - 60kw	20 - 30kw	1200kw
Station 6	10 - 60kw	20 - 30kw	1200kw
Station 7	10 - 60kw	20 - 30kw	1200kw

From the heater arrangement, we can see that the bottom heaters are the same for any station - 10-60kw heaters. The power is 1800kw at the two entrance stations and then evened-out later.

Under the same operating procedure as described in Case 2, the total heat each car receives is the same as in Case 2. However, more heat is shifted from the bottom to the sides. This effect can be seen in the following heat breakdown for each station:

The Breakdown of Heat Received by Each Car at Different Stations

	Bottom	Side	Total
Station 1	14kwh	28kwh	42kwh
Station 2	14kwh	28kwh	42kwh
Station 3	14kwh	22.4kwh	36.4kwh
Station 4	14kwh	14kwh	28kwh
Station 5	14kwh	14kwh	28kwh
Station 6	14kwh	14kwh	28kwh
Station 7	14kwh	14kwh	28kwh
Total	98kwh (334,470 Btu)	134.4kwh (458,710 Btu)	232.4kwh (793,180 Btu)

Case 4. Reduce Total Heating Power and Reduce the Number of Bottom Heaters

In this case, we reduce the bottom heating power for each station to 480kw. The total heating power for the thaw shed is also reduced from 9960kw to 8760kw. This arrangement serves two purposes: (1) reduce the possibility of overheating, (2) provide more flexibility to increase the power setting for more efficient heating. The heater arrangement is:

	No. of Heaters		Total Power
	Bottom	Sides	
Station 1	8 - 60kw	20 - 60kw	1680kw
Station 2	8 - 60kw	20 - 60kw	1680kw
Station 3	8 - 60kw	10 - 60kw	1080kw
Station 4	8 - 60kw	20 - 30kw	1080kw
Station 5	8 - 60kw	20 - 30kw	1080kw
Station 6	8 - 60kw	20 - 30kw	1080kw
Station 7	8 - 60kw	20 - 30kw	1080kw

Under the same operating prodedures as in other cases, the heat received by each car is approximately 204 kwh. If we increase the power setting to 80%, the heat can be raised to 233 kwh. For severe weather conditions,the power setting can be adjusted to even 90% if no overheating occurrs. The heat break-down for each station is as follows:

The Breakdown of Heat Received by Each Car at Different Stations

	Bottom	Sides	Total
Station 1	11.2kwh	28kwh	39.2kwh
Station 2	11.2kwh	28kwh	39.2kwh

Station 3	11.2kwh	14kwh	25.2kwh
Station 4	11.2kwh	14kwh	25.2kwh
Station 5	11.2kwh	14kwh	25.2kwh
Station 6	11.2kwh	14kwh	25.2kwh
Station 7	11.2kwh	14kwh	25.2kwh
Total	78.4kwh	126kwh	204.2kwh

Among the four case studies, the Intermountain Power Service Corporation and the Power Operating and Maintenance Division both prefer to implement Case 2 which is to evenly distribute both the bottom and the side heaters. Therefore, we have estimated the cost and schedule based on the Case 2 arrangement.

VI. Cost Estimates and Schedule

To evenly distribute the heaters as discussed in Case 2, a significant electrical modification is required. The scope of work is to provide engineering, procurement and construction for the following modifications:

1. Remove sixteen 60kw heaters from Station 1. Redistribute the remaining twenty-four 60kw heaters in Station 1 for even heating.

2. Remove sixteen 60kw heaters from Station 2. Redistribute the remaining twenty-four 60kw heaters in Station 2 for even heating.

3. Remove six 60kw heaters from Station 3. Redistribute the remaining fourteen 60kw heaters and twenty 30kw heaters in Station 3 for even heating. Replace five spare 40 amp contactors in Cabinet 3 with five new 75 amp contactors.

4. Redistribute the existing Station 4 heaters and eight new 60kw heaters for even heating. Connect power cable from the new heaters to the spare contactors located in Cabinet 1.

5. Redistribute the existing Station 5 heaters and eight new 60kw heaters for even

heating. Connect the power cable from the new heaters to the spare contactors located in Cabinet 3.

6. Redistribute the existing Station 6 heaters and eight new 60kw heaters for even heating. Connect the power cable from the new heaters to the spare contactors located in Cabinet 1.

7. Redistribute the existing Station 7 heaters and fourteen new 60kw heaters for even heating. Connect the power cable to the spare contactors located in Cabinet 2.

8. Add a cable tray for outside power cable routing.

9. Modify the control panel with over-voltage, percent power and station on/off controls.

10. Add the cabinet with modicon PLC (64/256 I/O). Provide control wiring to contactors for all heaters.

The modification work has been estimated by the electrical engineers in Fiscal Year 1991-1992 dollars as follows:

	MHRS	COST In $1,000'S
Engineering	800	$24.2
Drafting	240	$5.0
		$29.2
Materials		
Modify Control Panel		$5.0
New 75 amp contactors		$2.0
#4 awg type EPR heater cable		$35.0
Cable tray		$12.0
PLC controls		$14.0
		$68.0
Electrical Construction		
Heater relocation	720	
Cable tray installation	600	
Control rewiring	600	
	1920	$42.2

Test/start-up		$12.0
Indirect cost		$30.4
	Total cost	$181.8

This work is estimated to require approximately 9 months from job start to job completion.

VII. Summary and Recommendations

The power industry has used thaw sheds to thaw frozen coal for many years; however, there is no design standard nor reliable criteria for thaw shed design. We can not find any published paper or data base on which a thorough investigation can be made. People just design the thaw shed by using their experience and consideration of jobsite specific conditions. No serious study on thaw shed performance has ever been attempted by the power industry.

In this report, we have used the most basic theories of thermodynamics and heat transfer to investigate the thaw shed performance. To make this basic approach possible, a few assumptions are made to simplify our calculations. The detailed analysis and calculations were transmitted to IGS for review on April 16, 1992. As the results of this study, a few conclusions are made:

1. The heat provided by the heaters can never thaw the completely frozen coal in the coal car. Thus, the purpose of the thaw shed is only to break the bond and thaw partially the coal from the surface.

2. Soaking is necessary for allowing time for heat to penetrate into the coal.

3. Each car receives the same amount of heat no matter how the heaters are arranged under the current operating procedures for motion heating.

4. Overheating can be avoided by redistributing the heaters.

5. The theoretical heat requirement for thawing the coal is developed.

6. The most effective thawing happens when the car is first exposed to the heat; however the effectiveness decreases after the coal is partially thawed.

Based on the theoretical study presented in this report, we have concluded that both Case 2 and Case 3 heater arrangements are the most cabable of thawing the frozen coal. However, we recommend implementing the Case 2 heater arrangement due to the following reasons:

1. This is preferred by the operators who have experience working in the IGS thaw shed.

2. The heater rearrangement is simple.

3. Each car receives the same amount of heat.

4. There is enough heat for thawing under most conditions.

It should be noted that the power setting of 70% is used in our recommendation. During extremely cold weather, the power setting may be set at a higher percentage. It is suggested that, after the rearrangement, the operators of the thaw shed adjust the power setting according the ambient temperature to find the best workable condition. In other words, the power setting is the best method to balance the thawing requirement and the overheating.

It should also be noted that the heat requirement listed on Table 1 is for the most idealistic condition without heat loss. In reality, a percentage of heat is lost to the ambient air; therefore, the amount of heat for thawing provided by the heaters should be increased accordingly.

To prevent overheating the air hoses, we suggest:

1. Avoid exposing the air hoses directly over the heaters.

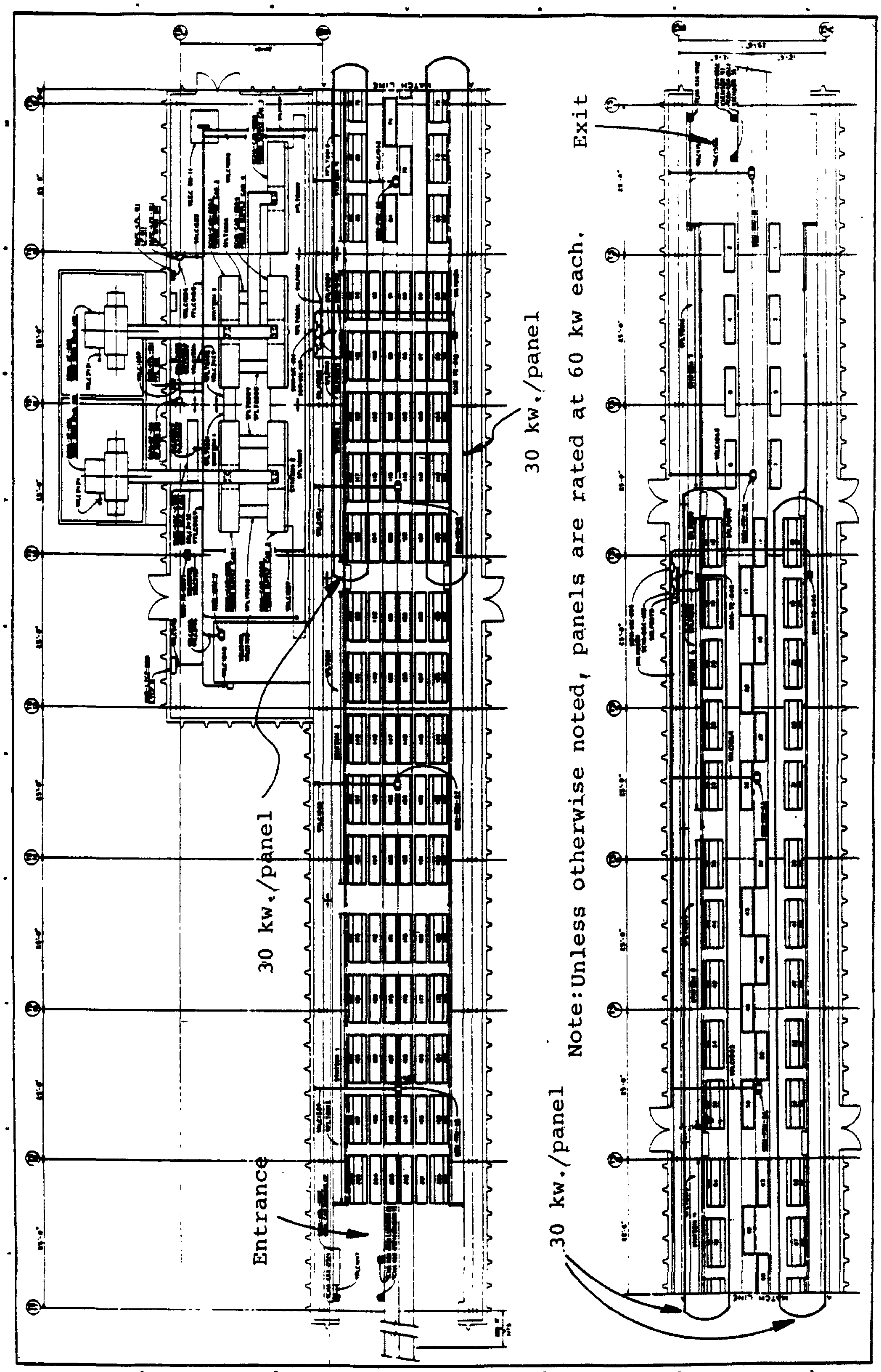
2. Relocate the air hoses to where they are not directly heated.

3. Insulate the air hoses.

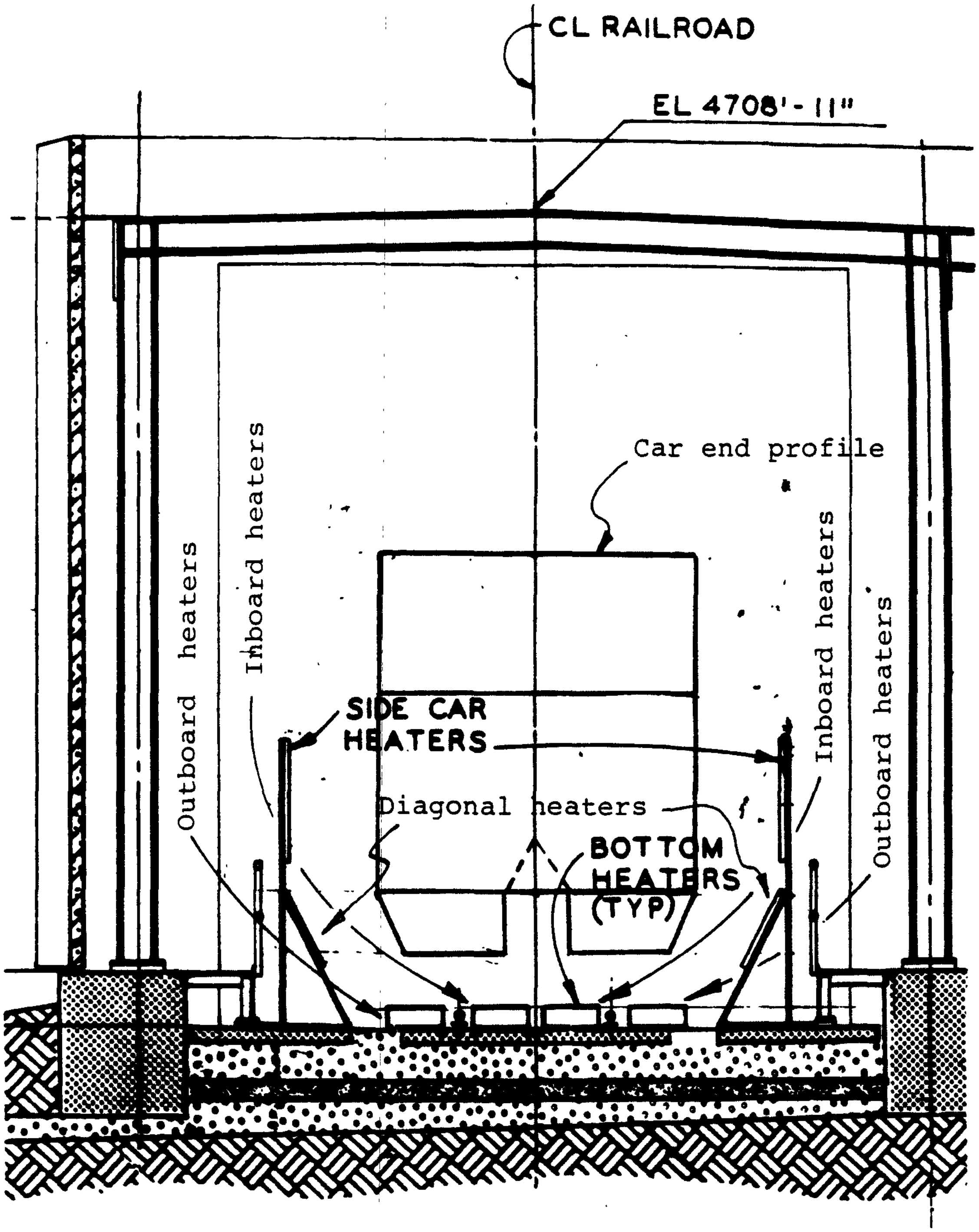
To implement the Case 2 heater arrangement, significant electrical modifications are required, such as new electrical cables, additional contactors and a Modicon control system. If Case 2 is implemented, we recommend that the Electrical Engineering Section of the Power Design and Construction Division be assigned the lead for completing the job.

Appendix

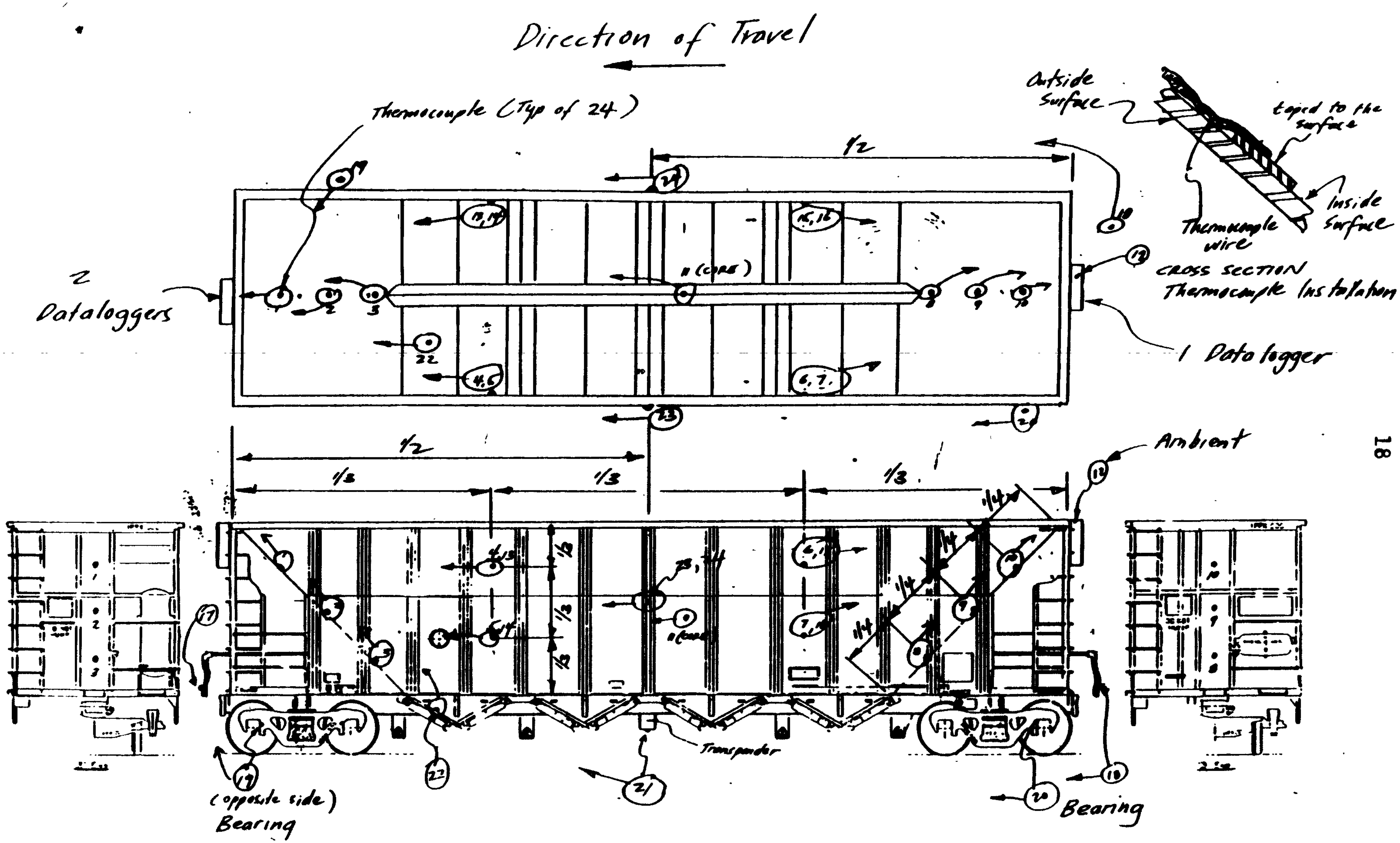
Recorded Time and Temperature Test Data



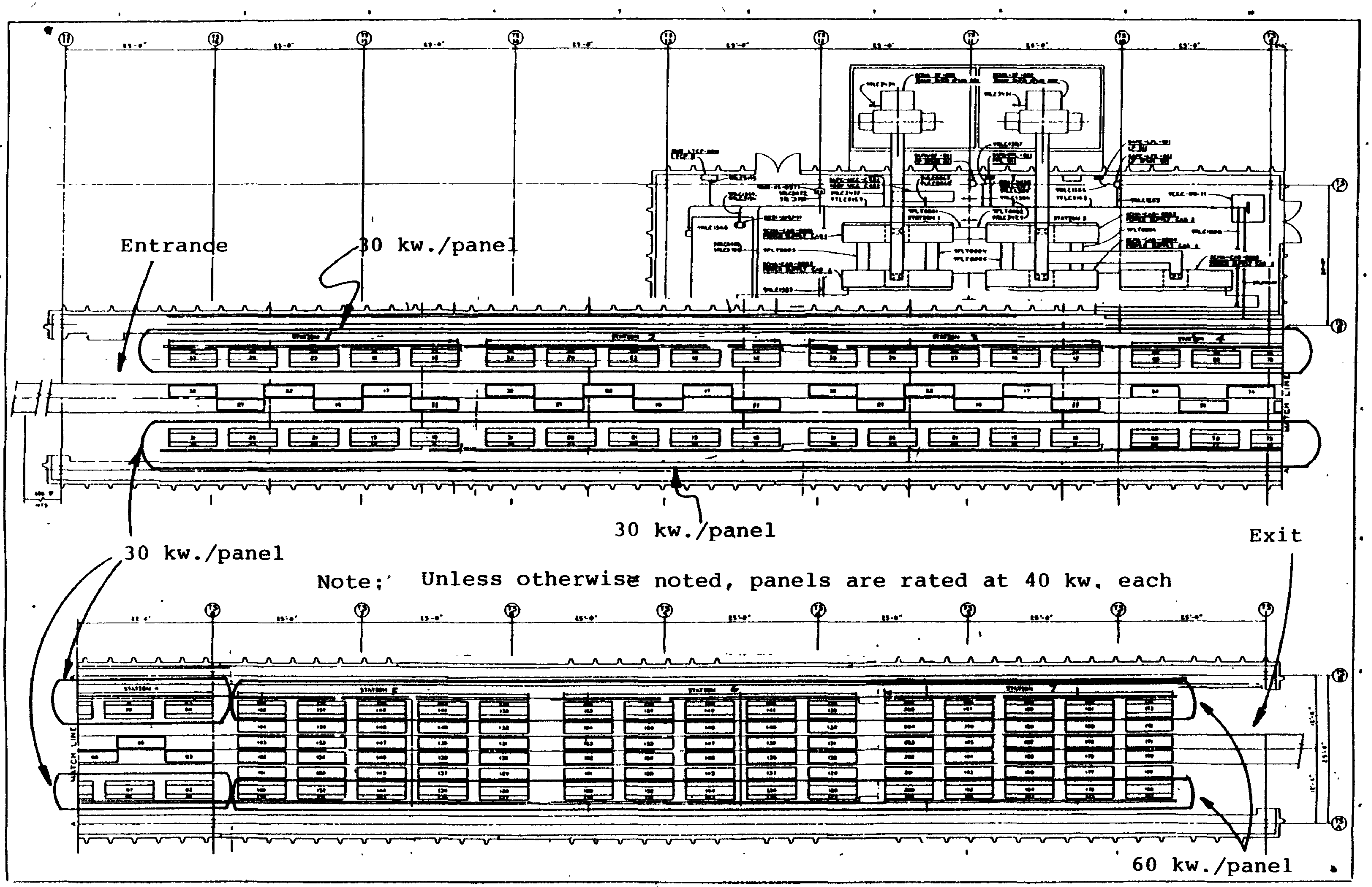
EXISTING CTS HEATER ARRANGEMENT
Figure 1.



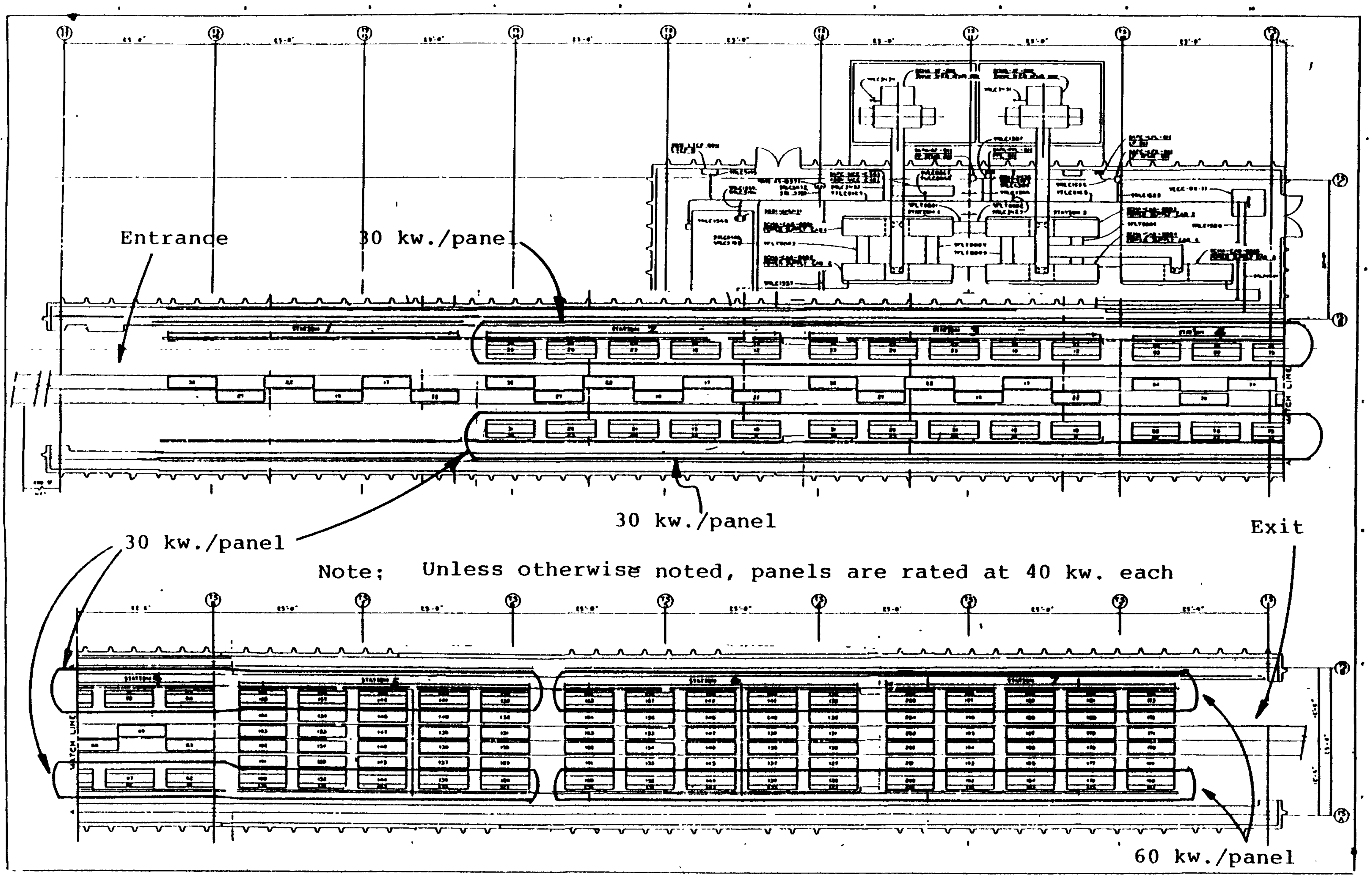
CTS END ELEVATION
Figure 1a.



THERMOCOUPLE LOCATIONS
CAR THAWING SYSTEM TEST- IGS
Figure 2.



PROPOSED CTS HEATER ARRANGEMENT No. 1
Figure 2a.



PROPOSED CTS HEATER ARRANGEMENT No. 2.
Figure 2b.

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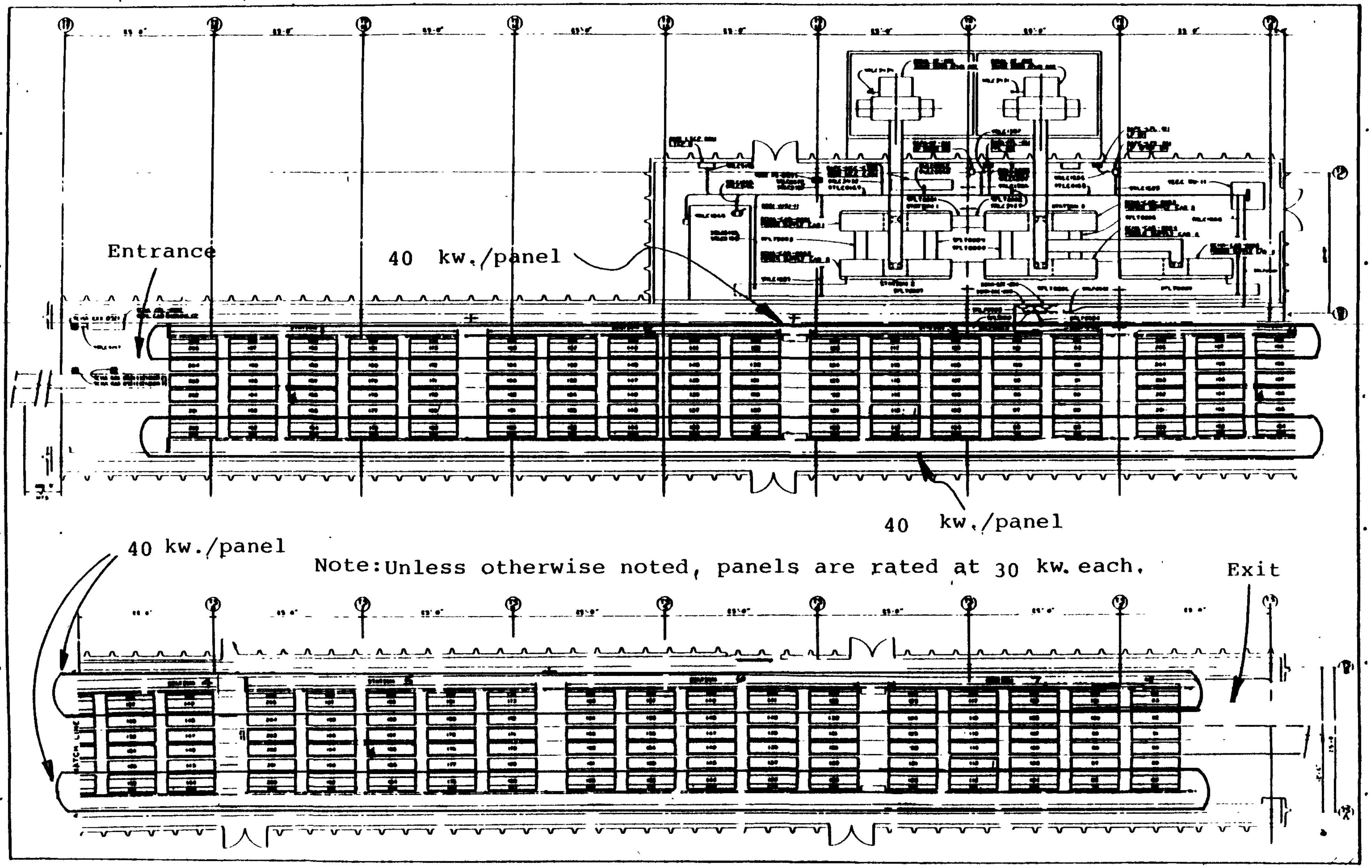


PO&M'S PROPOSED CTS HEATER ARRANGEMENT FOR
SEQUENCED OPERATION , Figure 2c.

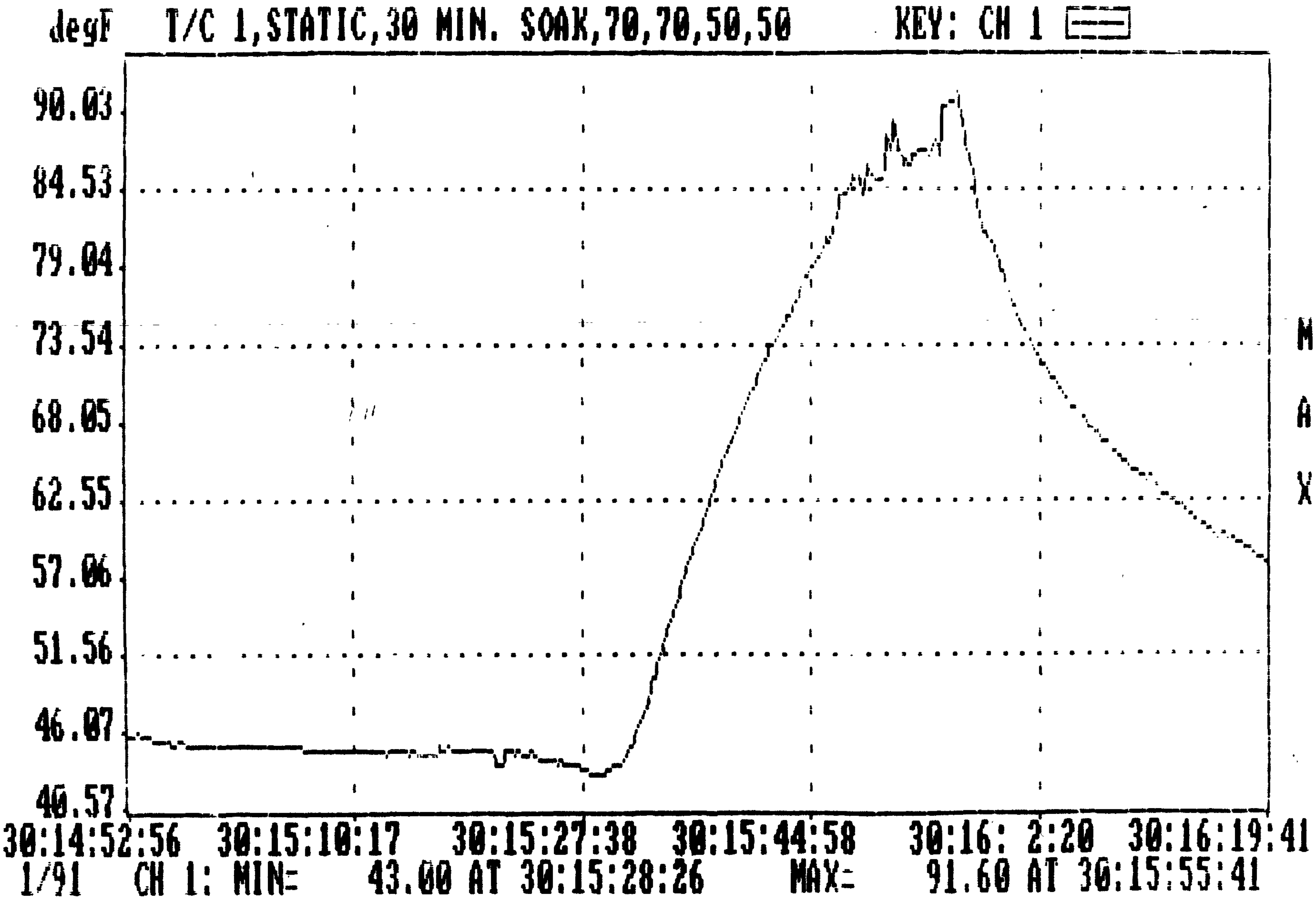

degF
T/C 1,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 1
90.03
84.53
79.04
73.54
68.05
62.55
57.06
51.56
46.07
40.57
30:14:52:56
30:15:10:17
30:15:27:38
30:15:44:58
30:16: 2:20
30:16:19:41
1/91
CH 1: MIN= 43.00 AT 30:15:28:26
MAX= 91.60 AT 30:15:55:41
M
A
X

Figure 3.

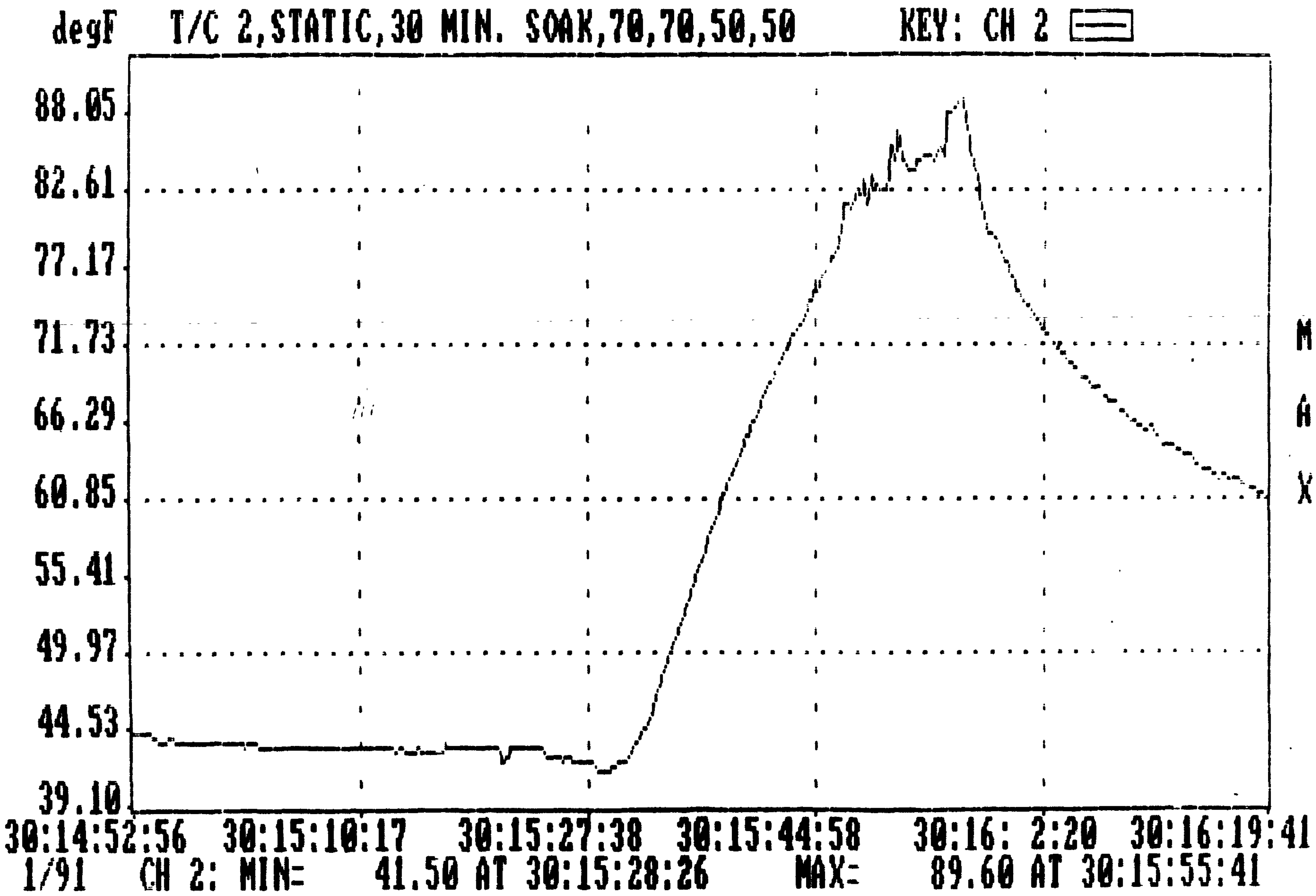


Figure 4.

IP12_002184

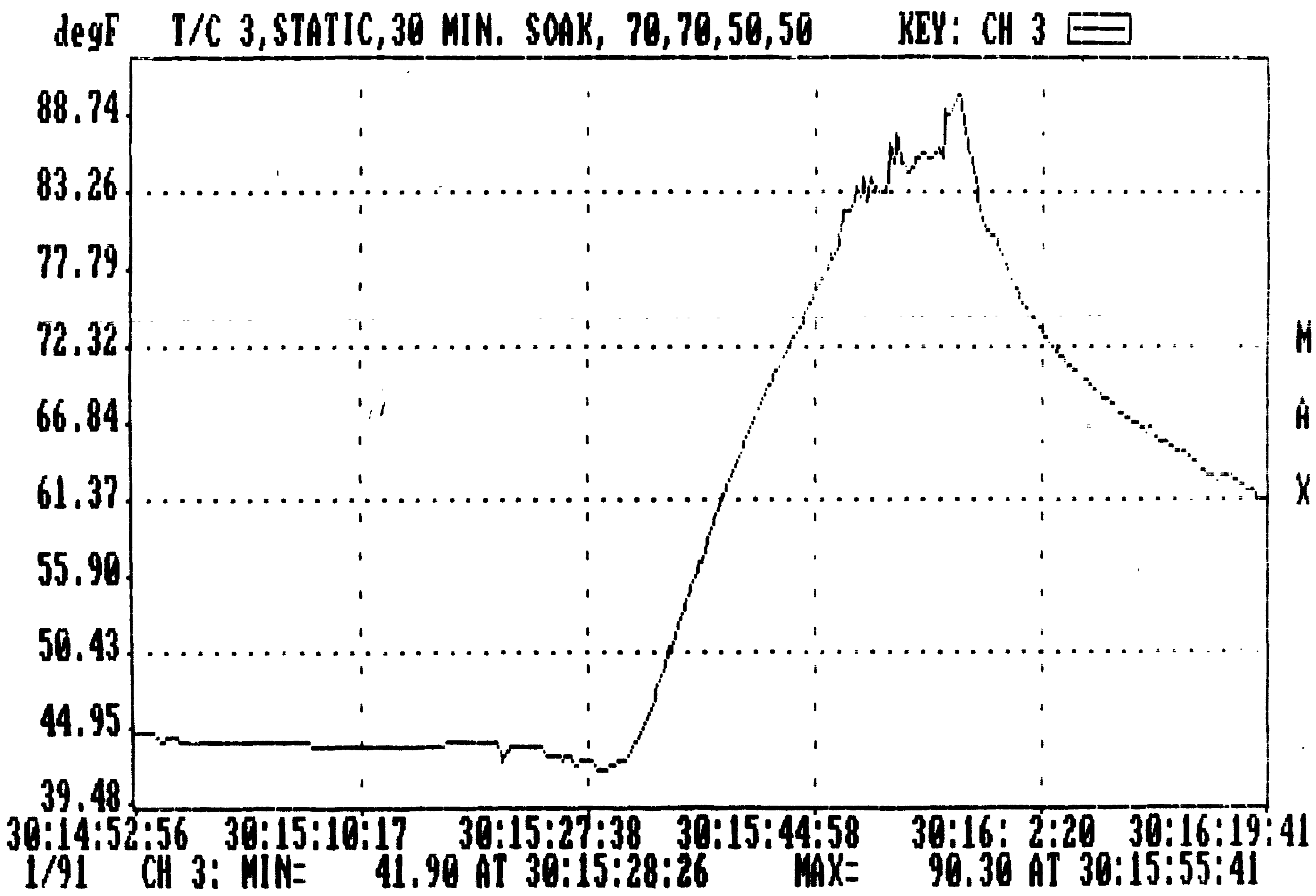

degF
T/C 3,STATIC,30 MIN. SOAK, 70,70,50,50
KEY: CH 3
88.74
83.26
77.79
72.32
66.84
61.37
55.90
50.43
44.95
39.48
30:14:52:56
30:15:10:17
30:15:27:38
30:15:44:58
30:16: 2:20
30:16:19:41
1/91
CH 3: MIN= 41.90 AT 30:15:28:26
MAX= 90.30 AT 30:15:55:41
MAX

Figure 5.

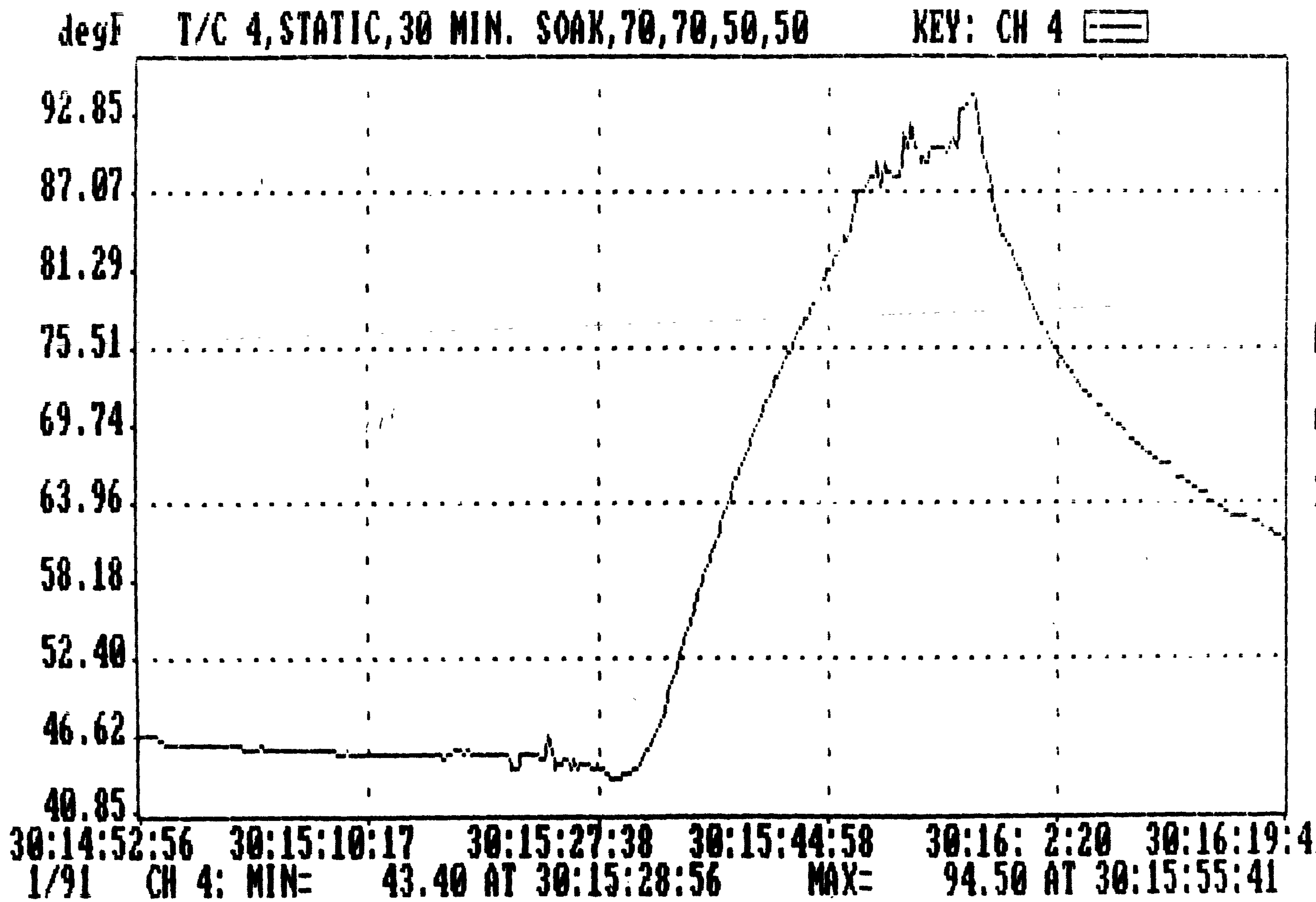

degF
T/C 4,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 4
92.85
87.07
81.29
75.51
69.74
63.96
58.18
52.40
46.62
40.85
30:14:52:56
30:15:10:17
30:15:27:38
30:15:44:58
30:16: 2:20
30:16:19:41
1/91
CH 4: MIN= 43.40 AT 30:15:28:56
MAX= 94.50 AT 30:15:55:41
M
A
X

Figure 6.

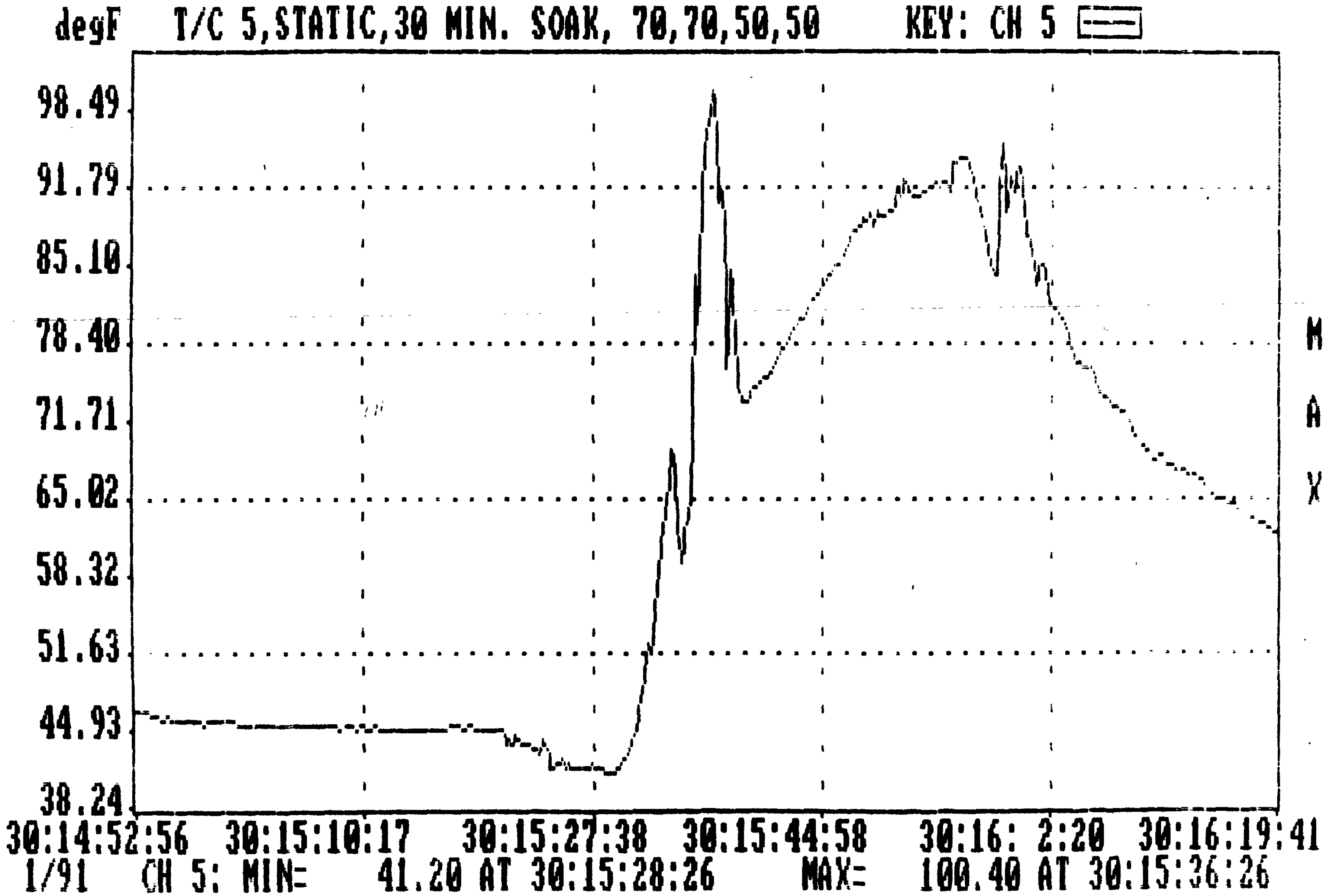


Figure 7.

IP12_002187

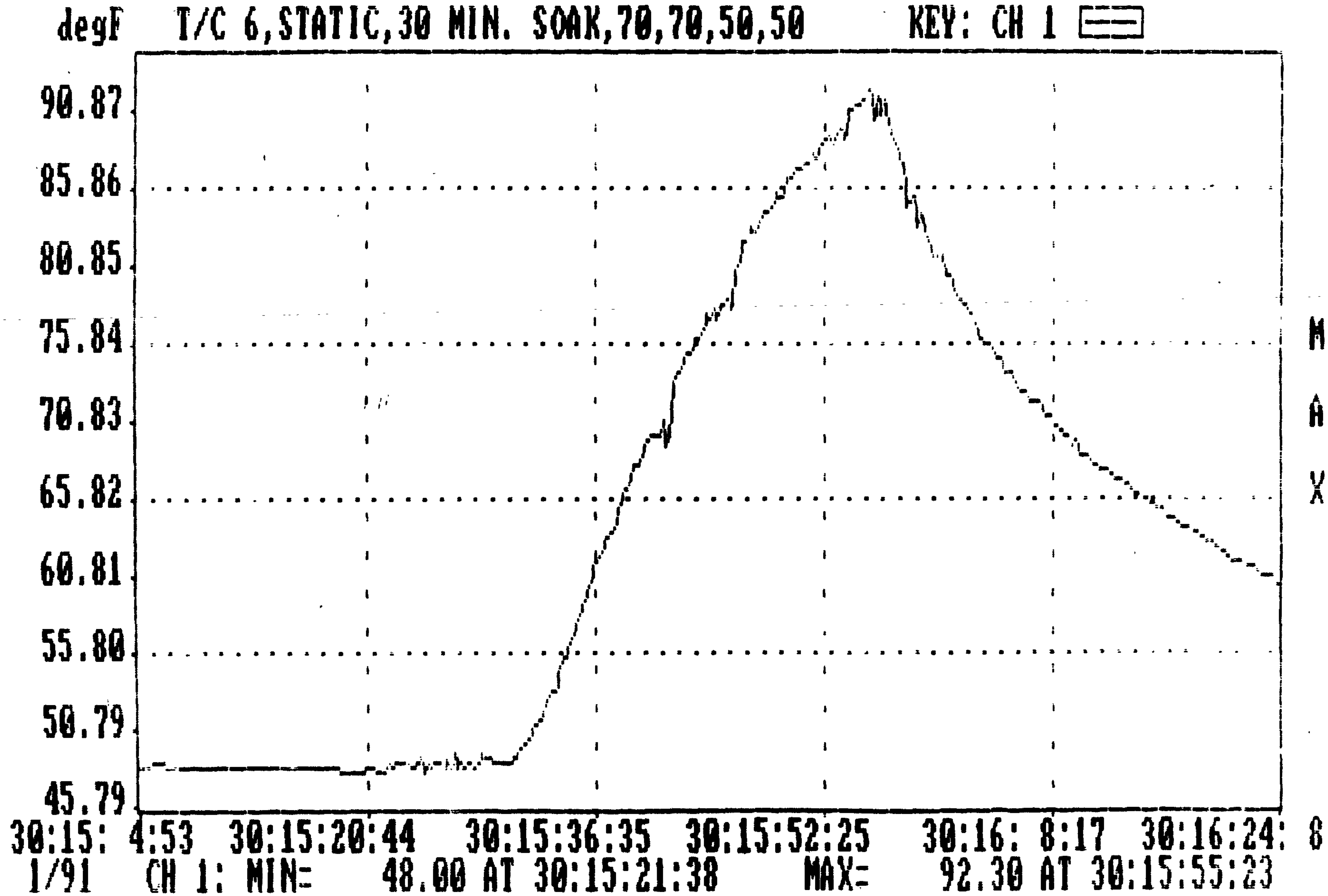

degF
T/C 6,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 1
90.87
85.86
80.85
75.84
70.83
65.82
60.81
55.80
50.79
45.79
MAX
30:15: 4:53
1/91
30:15:20:44
30:15:36:35
30:15:52:25
30:16: 8:17
30:16:24: 8
CH 1: MIN= 48.00 AT 30:15:21:38
MAX= 92.30 AT 30:15:55:23

Figure 8.

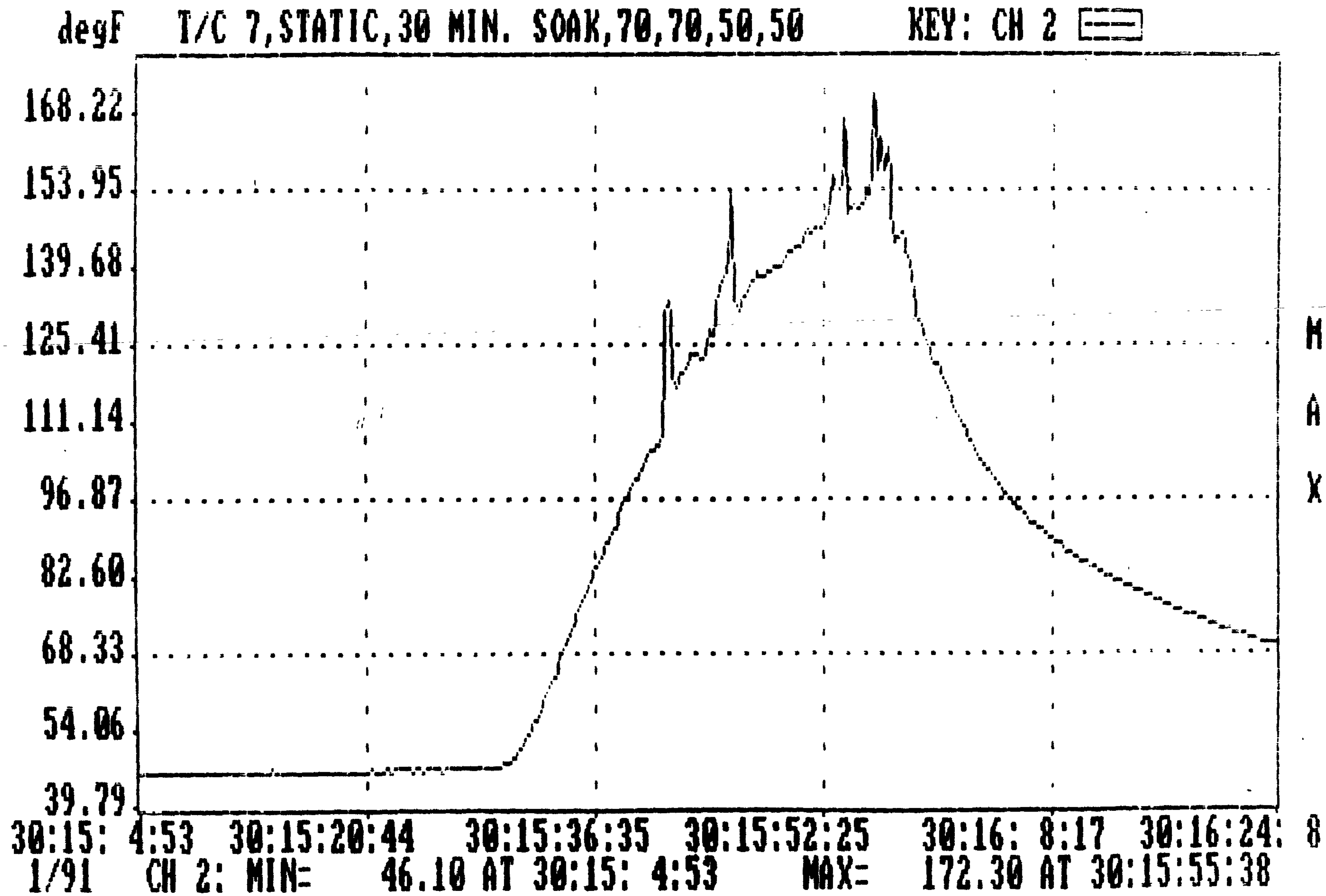

degF
T/C 7,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 2
168.22
153.95
139.68
125.41
111.14
96.87
82.60
68.33
54.06
39.79
M
A
X
30:15: 4:53
30:15:20:44
30:15:36:35
30:15:52:25
30:16: 8:17
30:16:24: 8
1/91
CH 2: MIN= 46.10 AT 30:15: 4:53
MAX= 172.30 AT 30:15:55:38

Figure 9.

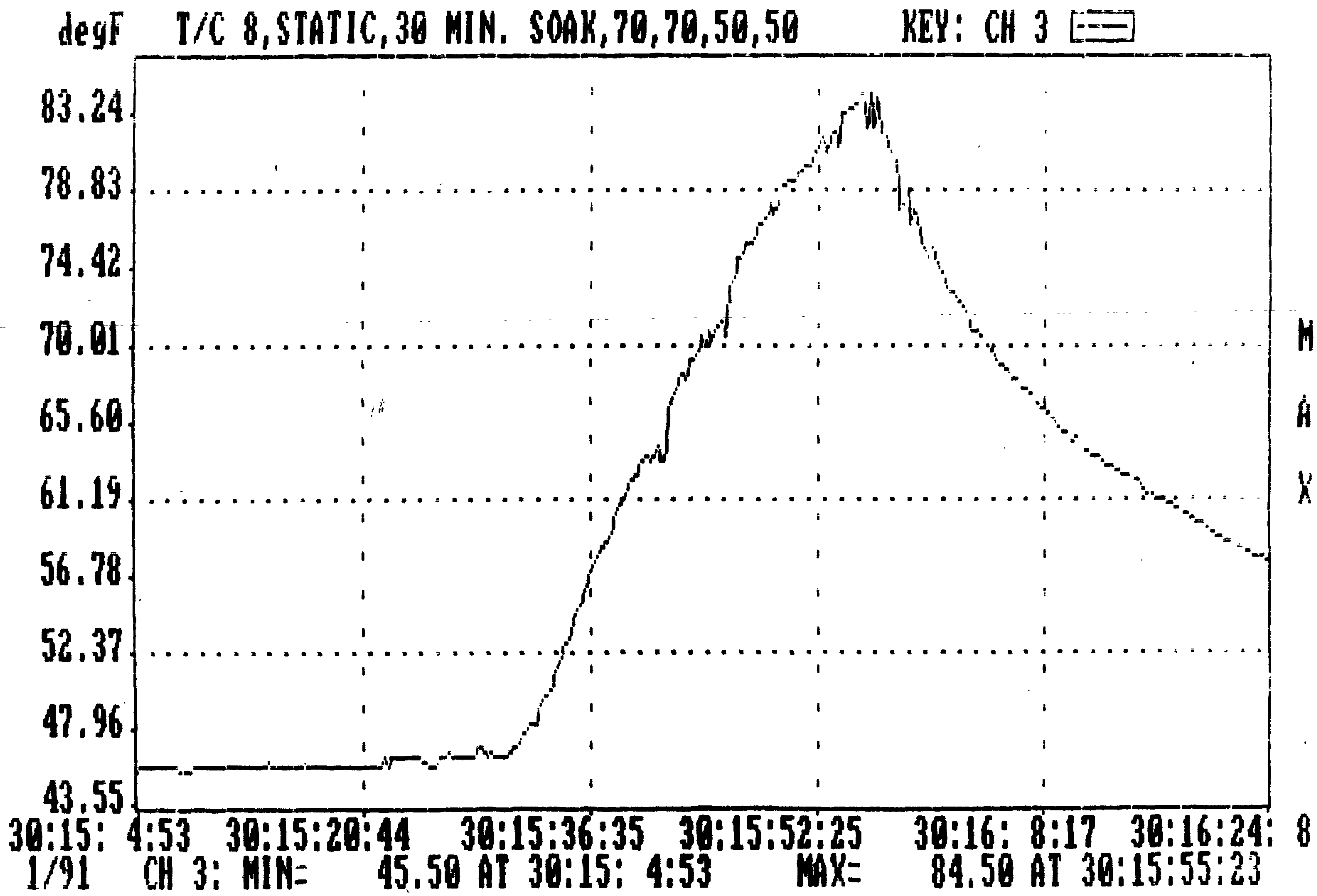

degF
T/C 8,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 3
83.24
78.83
74.42
70.01
65.60
61.19
56.78
52.37
47.96
43.55
M
A
X
30:15: 4:53
30:15:20:44
30:15:36:35
30:15:52:25
30:16: 8:17
30:16:24: 8
1/91
CH 3: MIN= 45.50 AT 30:15: 4:53
MAX= 84.50 AT 30:15:55:23

Figure 10.

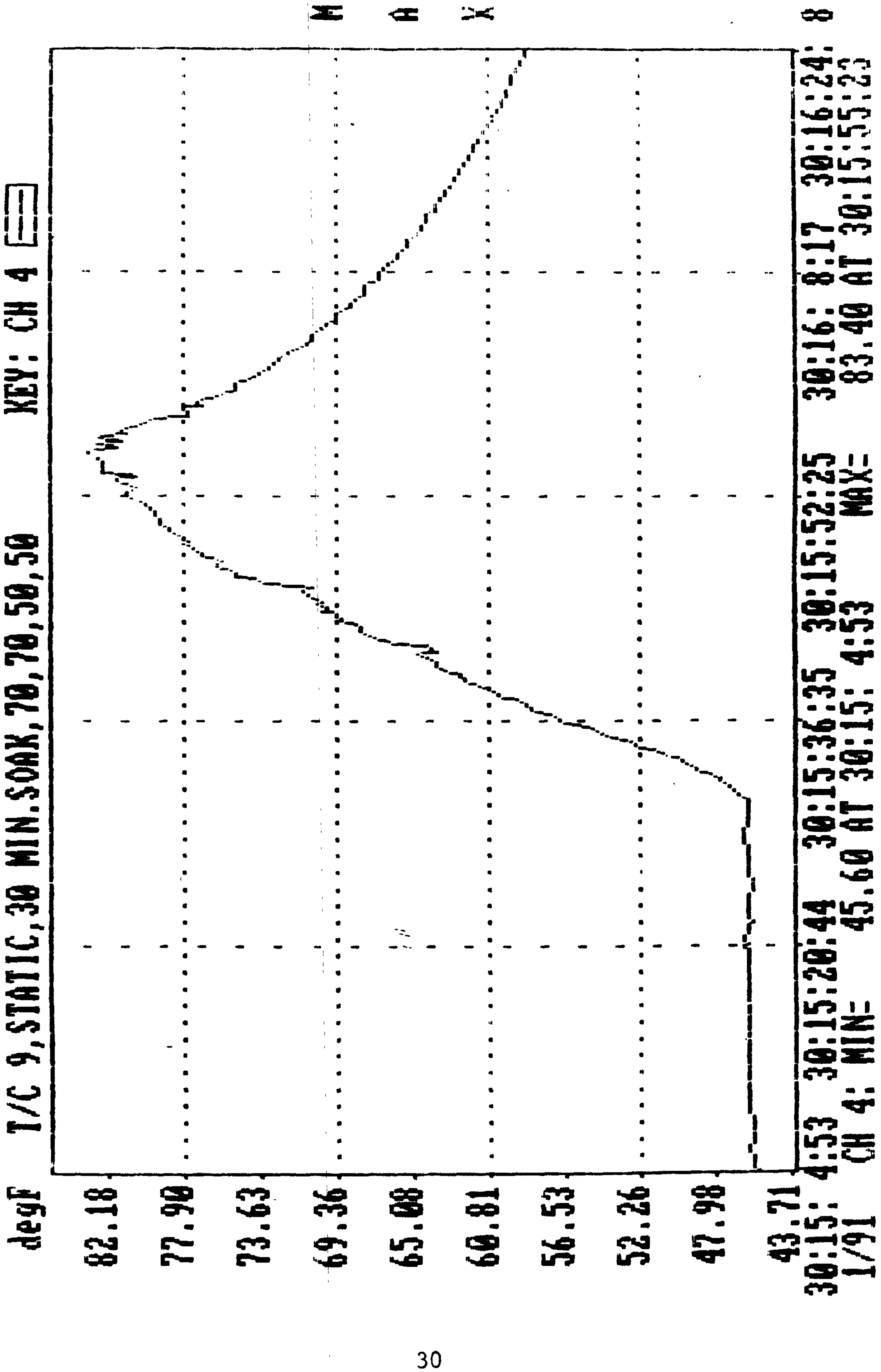


Figure 11.

IP12_002191

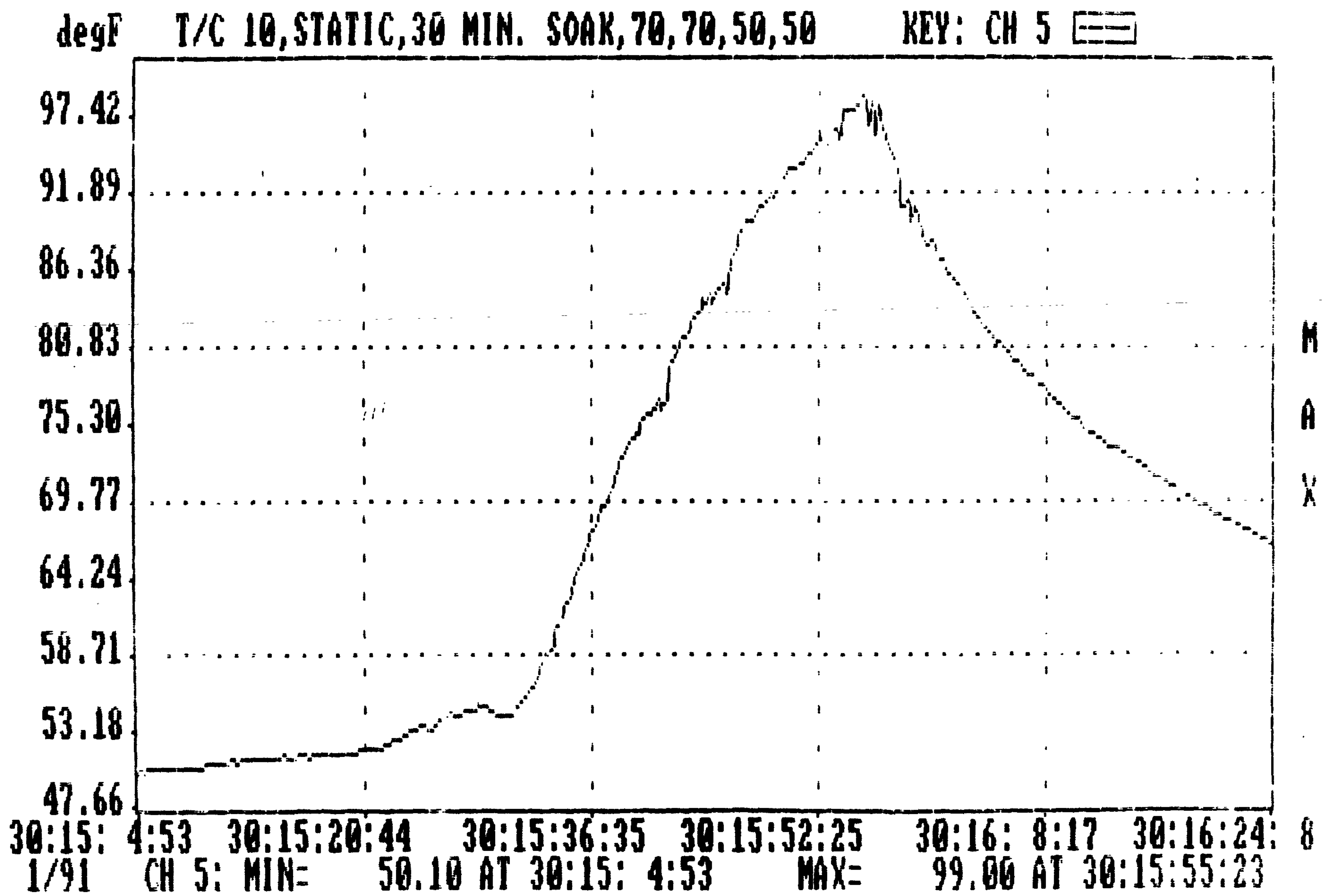

degF
T/C 10,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 5
97.42
91.89
86.36
80.83
75.30
69.77
64.24
58.71
53.18
47.66
MAX
30:15: 4:53
30:15:20:44
30:15:36:35
30:15:52:25
30:16: 8:17
30:16:24: 8
1/91
CH 5: MIN= 50.10 AT 30:15: 4:53
MAX= 99.00 AT 30:15:55:23

Figure 12.

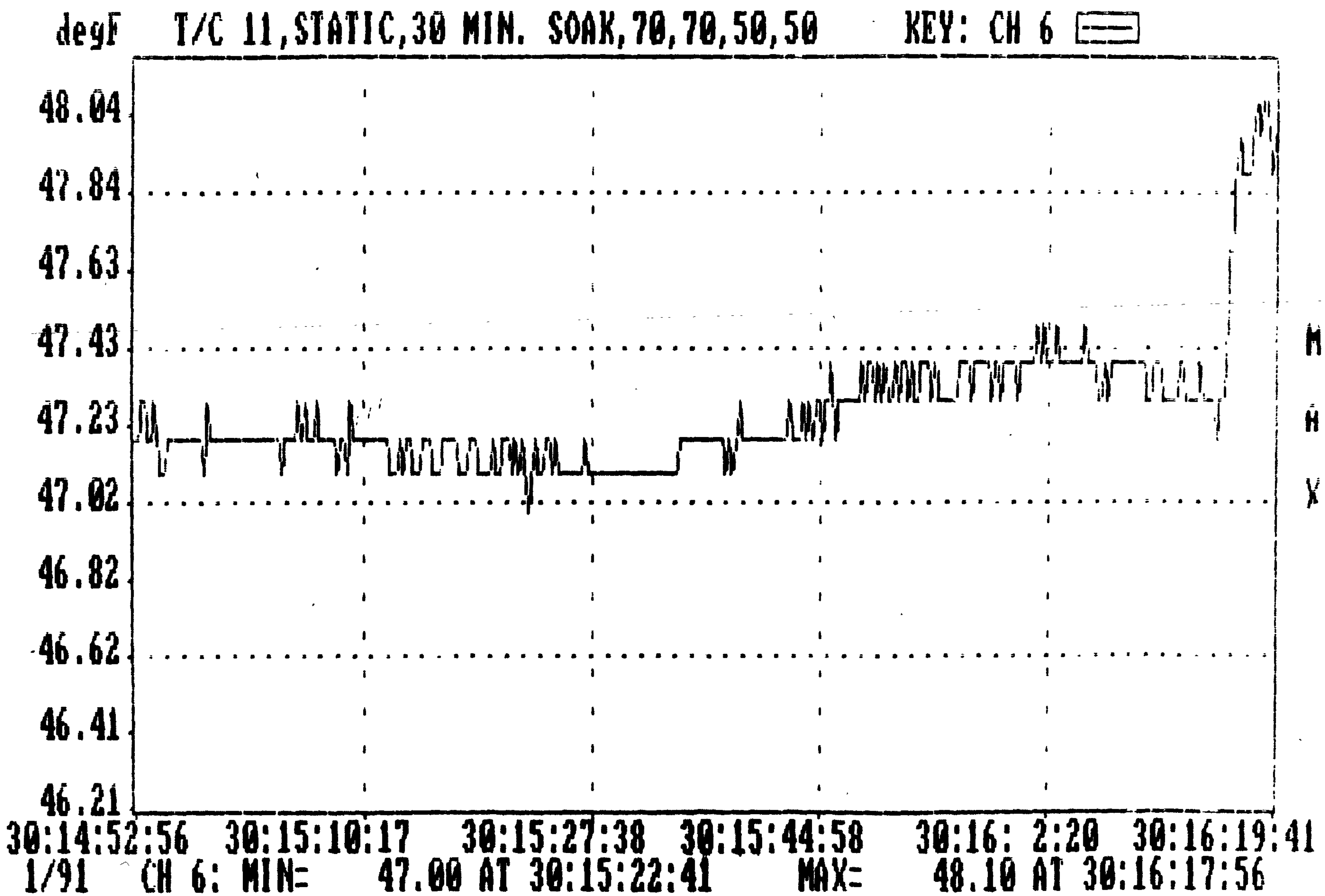


Figure 13.

IP12_002193

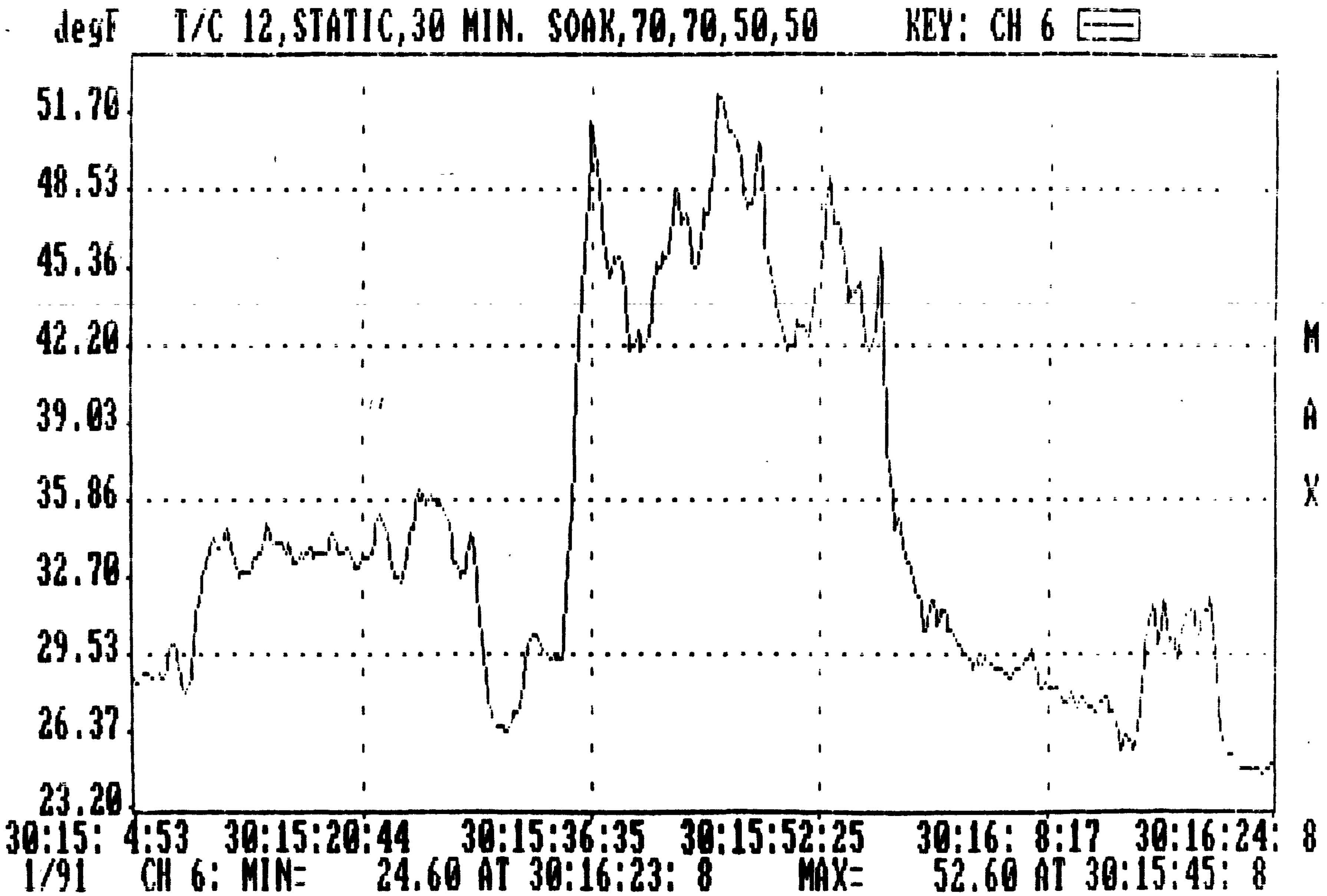

degF
T/C 12,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 6
51.70
48.53
45.36
42.20
39.03
35.86
32.70
29.53
26.37
23.20
MAX
30:15: 4:53
30:15:20:44
30:15:36:35
30:15:52:25
30:16: 8:17
30:16:24: 8
1/91
CH 6: MIN= 24.60 AT 30:16:23: 8
MAX= 52.60 AT 30:15:45: 8

Figure 14.

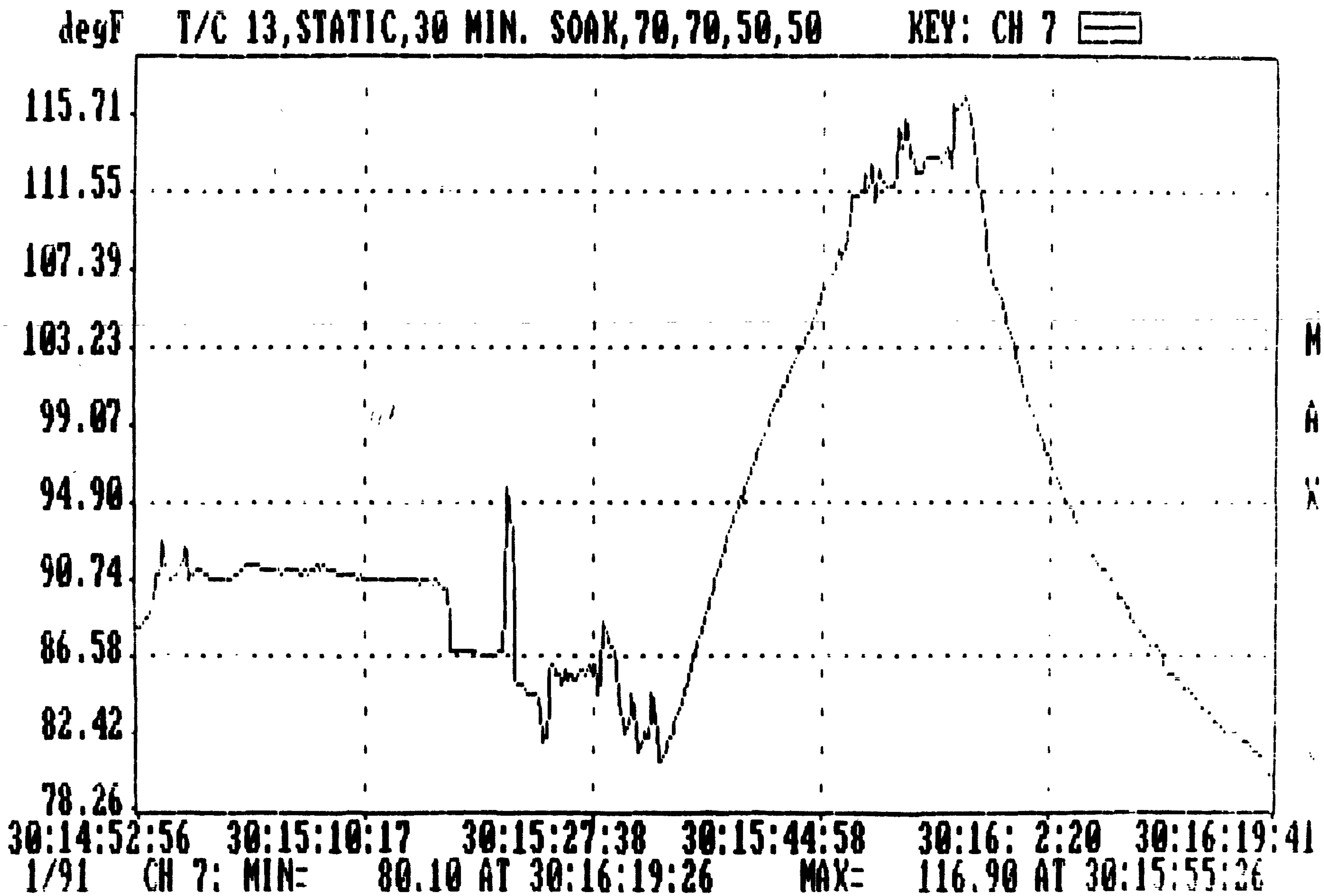


Figure 15.

IP12_002195

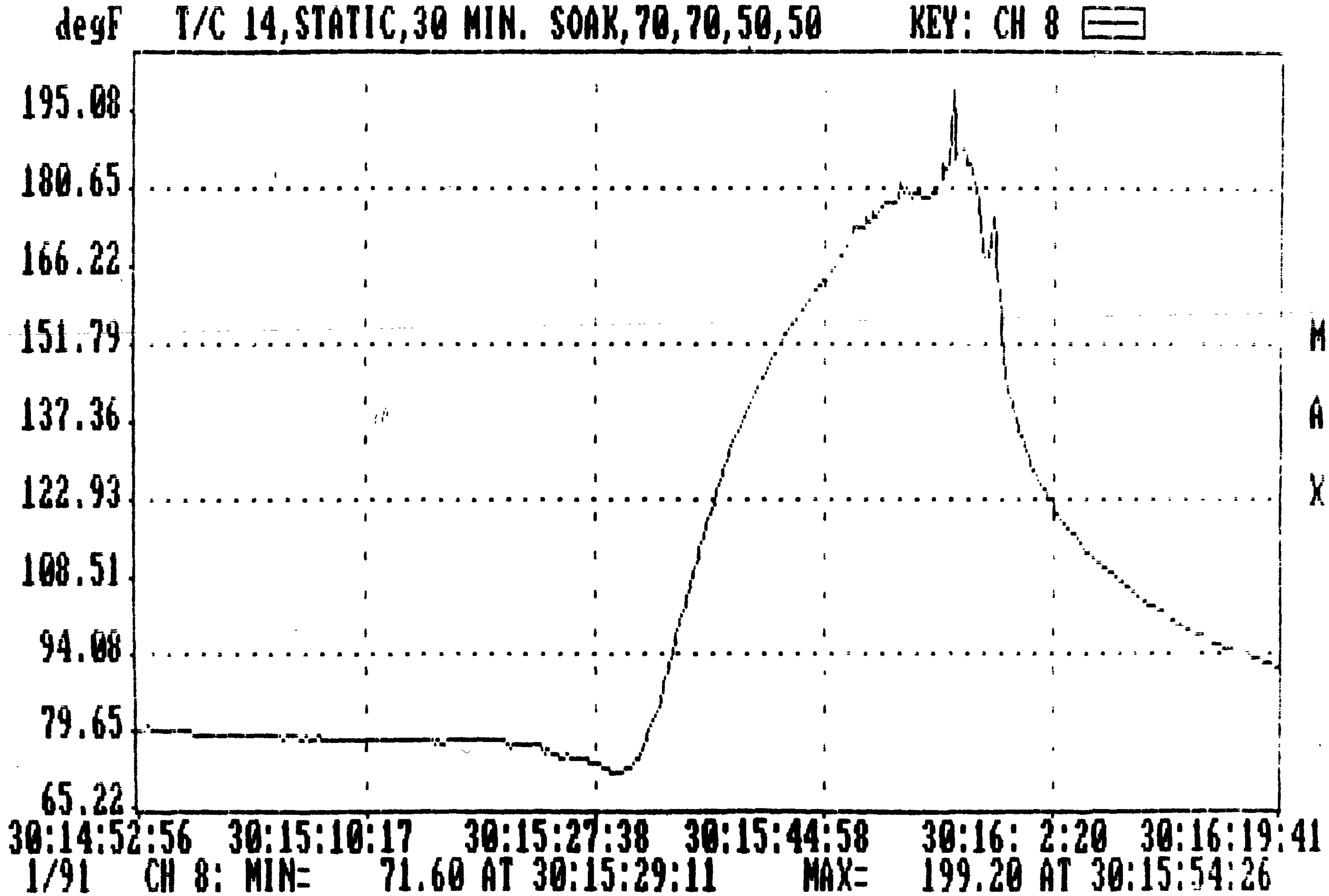

degF
T/C 14,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 8
195.08
180.65
166.22
151.79
137.36
122.93
108.51
94.08
79.65
65.22
MAX
30:14:52:56
30:15:10:17
30:15:27:38
30:15:44:58
30:16: 2:20
30:16:19:41
1/91
CH 8: MIN= 71.60 AT 30:15:29:11 MAX= 199.20 AT 30:15:54:26

Figure 16.

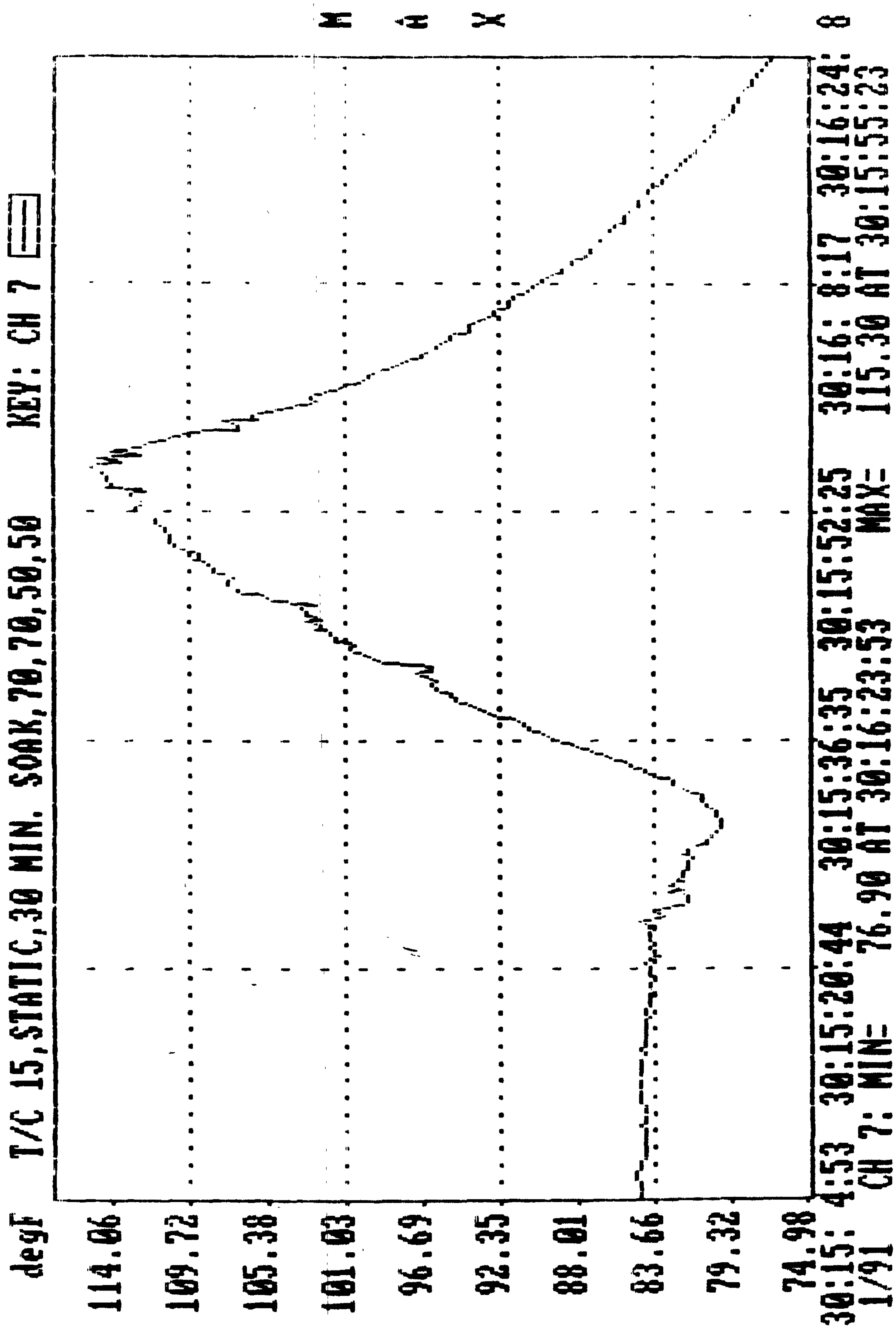

T/C 15,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 7
degF
114.06
109.72
105.38
101.03
96.69
92.35
88.01
83.66
79.32
74.98
30:15: 4:53
1/91
30:15:20:44
30:15:36:35
30:15:52:25
30:16: 8:17
30:16:24: 8
CH 7: MIN= 76.90 AT 30:16:23:53
MAX= 115.30 AT 30:15:55:23

Figure 17.

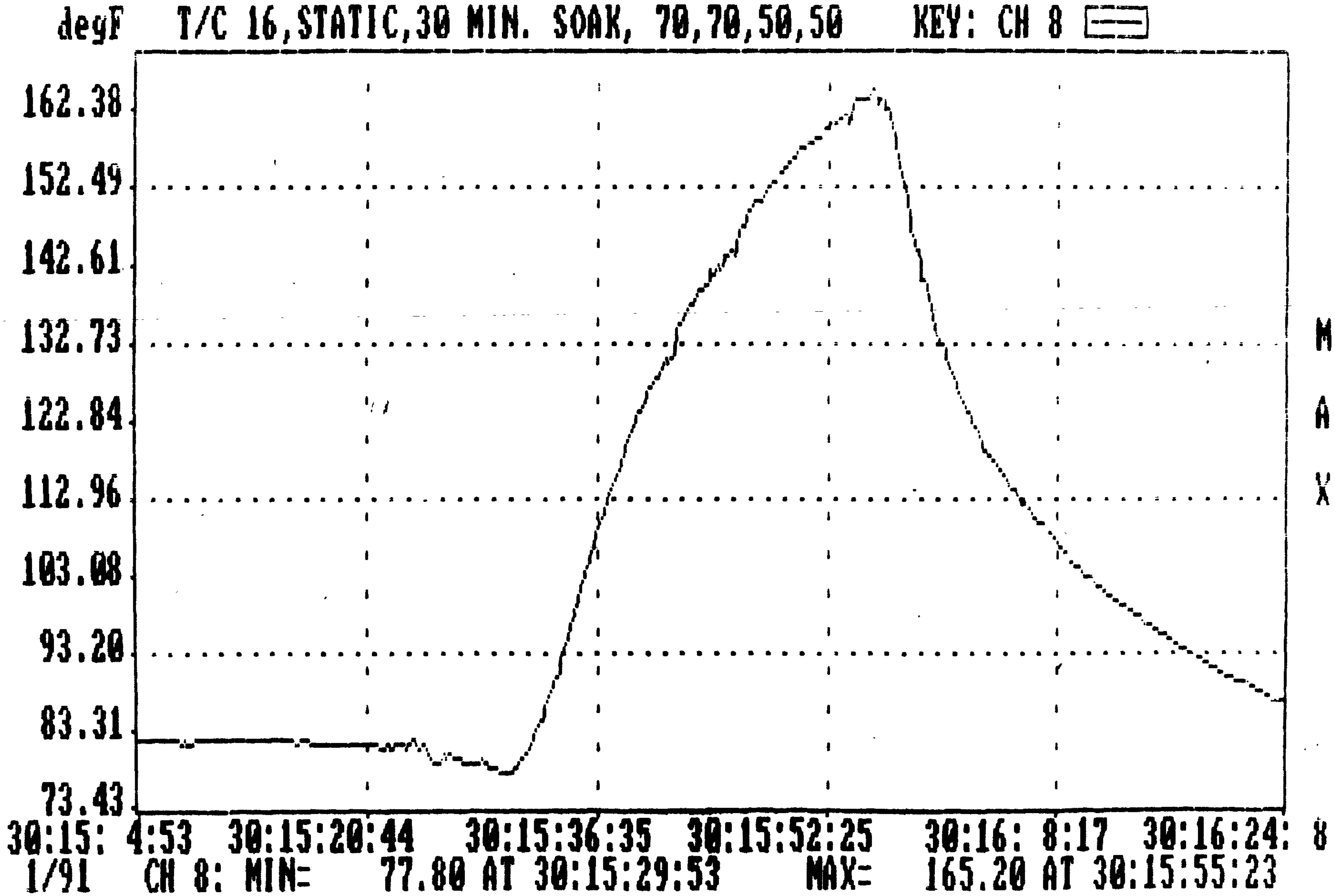

degF
T/C 16,STATIC,30 MIN. SOAK, 70,70,50,50
KEY: CH 8
162.38
152.49
142.61
132.73
122.84
112.96
103.08
93.20
83.31
73.43
M
A
X
30:15: 4:53
30:15:20:44
30:15:36:35
30:15:52:25
30:16: 8:17
30:16:24: 8
1/91
CH 8: MIN= 77.80 AT 30:15:29:53
MAX= 165.20 AT 30:15:55:23

Figure 18.

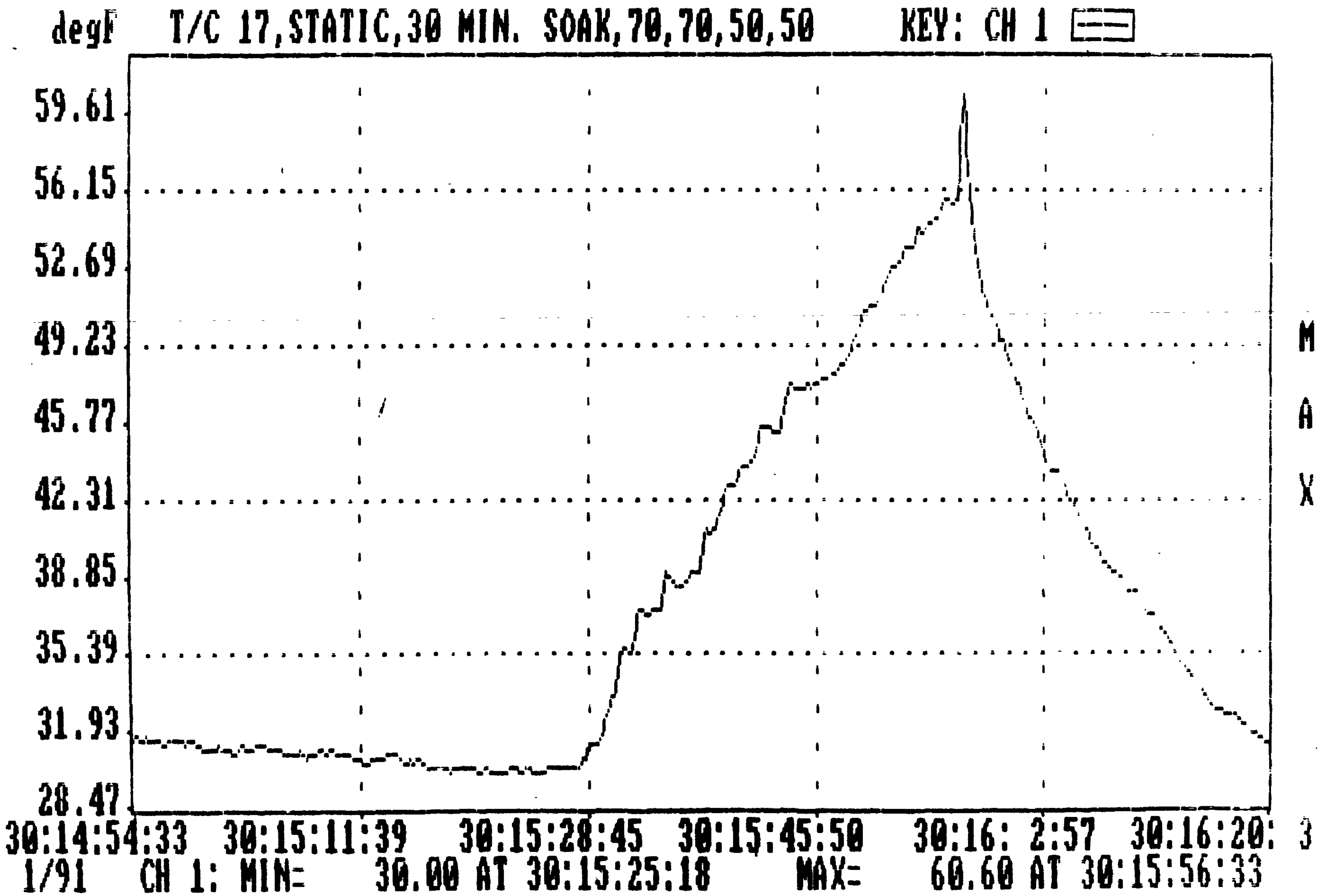

degF
T/C 17,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 1
59.61
56.15
52.69
49.23
45.77
42.31
38.85
35.39
31.93
28.47
MAX
30:14:54:33
30:15:11:39
30:15:28:45
30:15:45:50
30:16: 2:57
30:16:20: 3
1/91 CH 1: MIN= 30.00 AT 30:15:25:18 MAX= 60.60 AT 30:15:56:33

Figure 19.

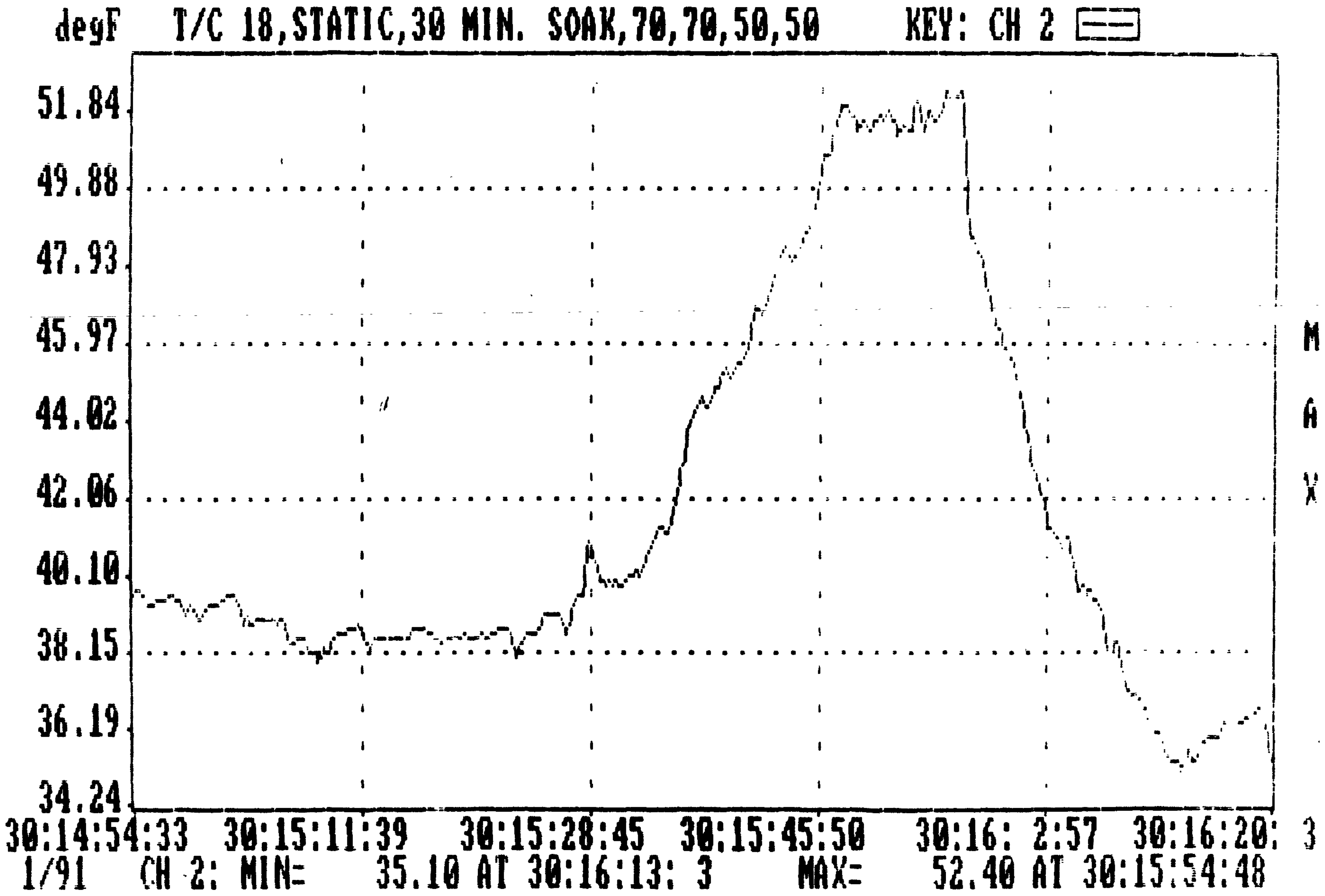

degF T/C 18,STATIC,30 MIN. SOAK,70,70,50,50 KEY: CH 2
51.84
49.88
47.93
45.97
44.02
42.06
40.10
38.15
36.19
34.24
30:14:54:33 30:15:11:39 30:15:28:45 30:15:45:50 30:16: 2:57 30:16:20: 3
1/91 CH 2: MIN= 35.10 AT 30:16:13: 3 MAX= 52.40 AT 30:15:54:48
MAX

Figure 20.

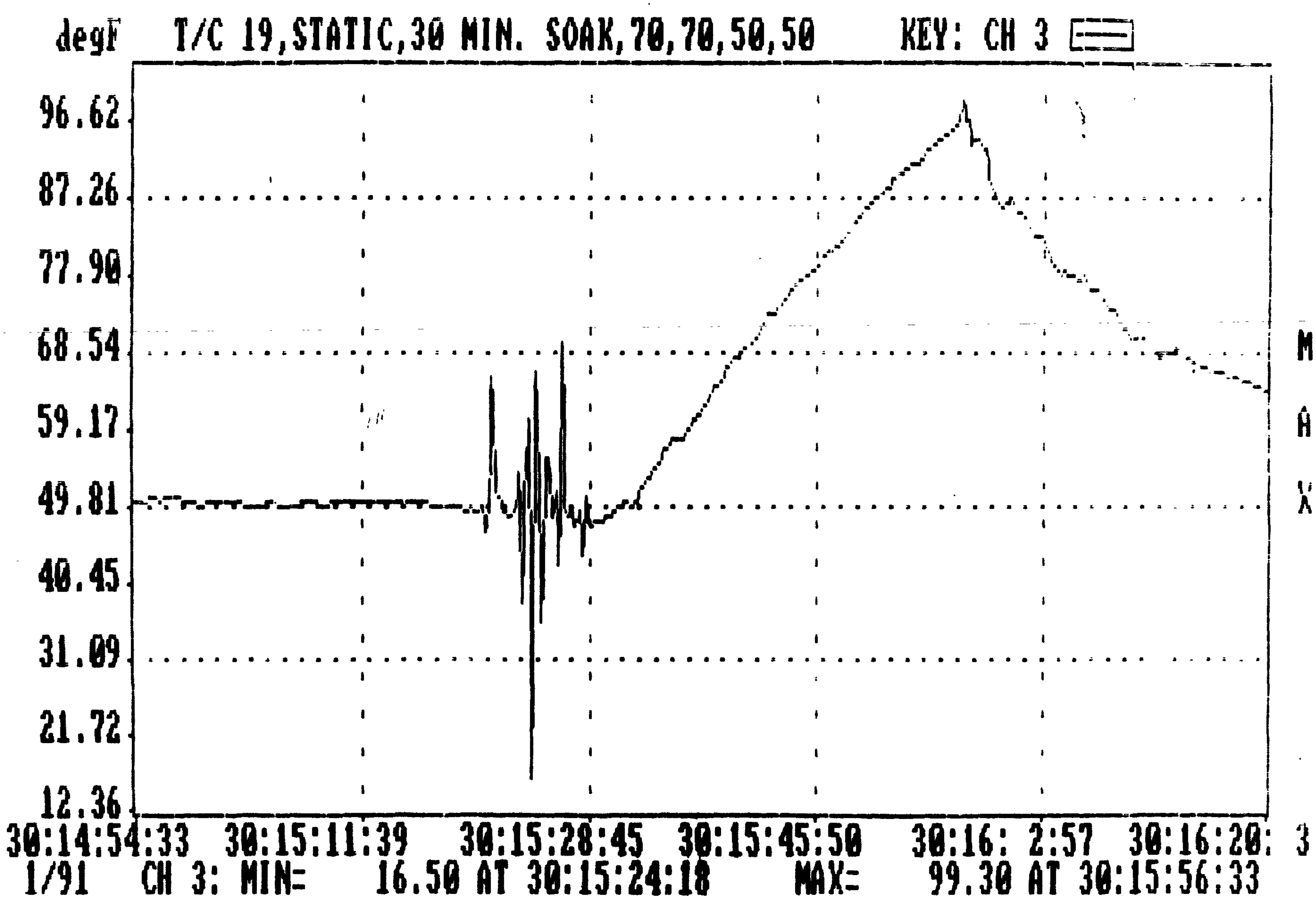

degF
T/C 19,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 3
96.62
87.26
77.90
68.54
59.17
49.81
40.45
31.09
21.72
12.36
30:14:54:33
30:15:11:39
30:15:28:45
30:15:45:50
30:16: 2:57
30:16:20:
3
1/91
CH 3: MIN= 16.50 AT 30:15:24:18
MAX= 99.30 AT 30:15:56:33
MAX

Figure 21.

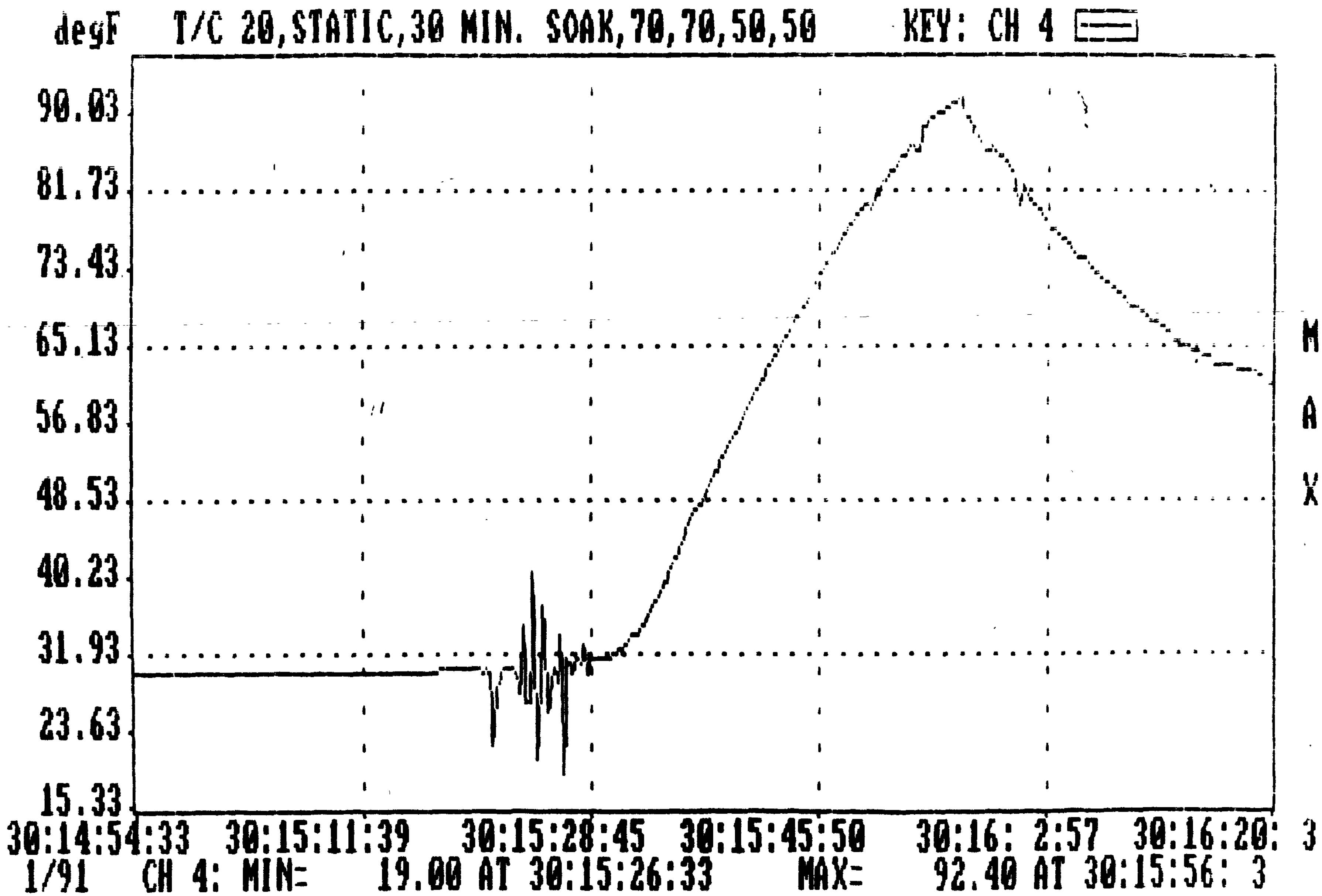

degF
T/C 20,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 4
90.03
81.73
73.43
65.13
56.83
48.53
40.23
31.93
23.63
15.33
M
A
X
30:14:54:33
30:15:11:39
30:15:28:45
30:15:45:50
30:16: 2:57
30:16:20: 3
1/91 CH 4: MIN= 19.00 AT 30:15:26:33 MAX= 92.40 AT 30:15:56: 3

Figure 22.

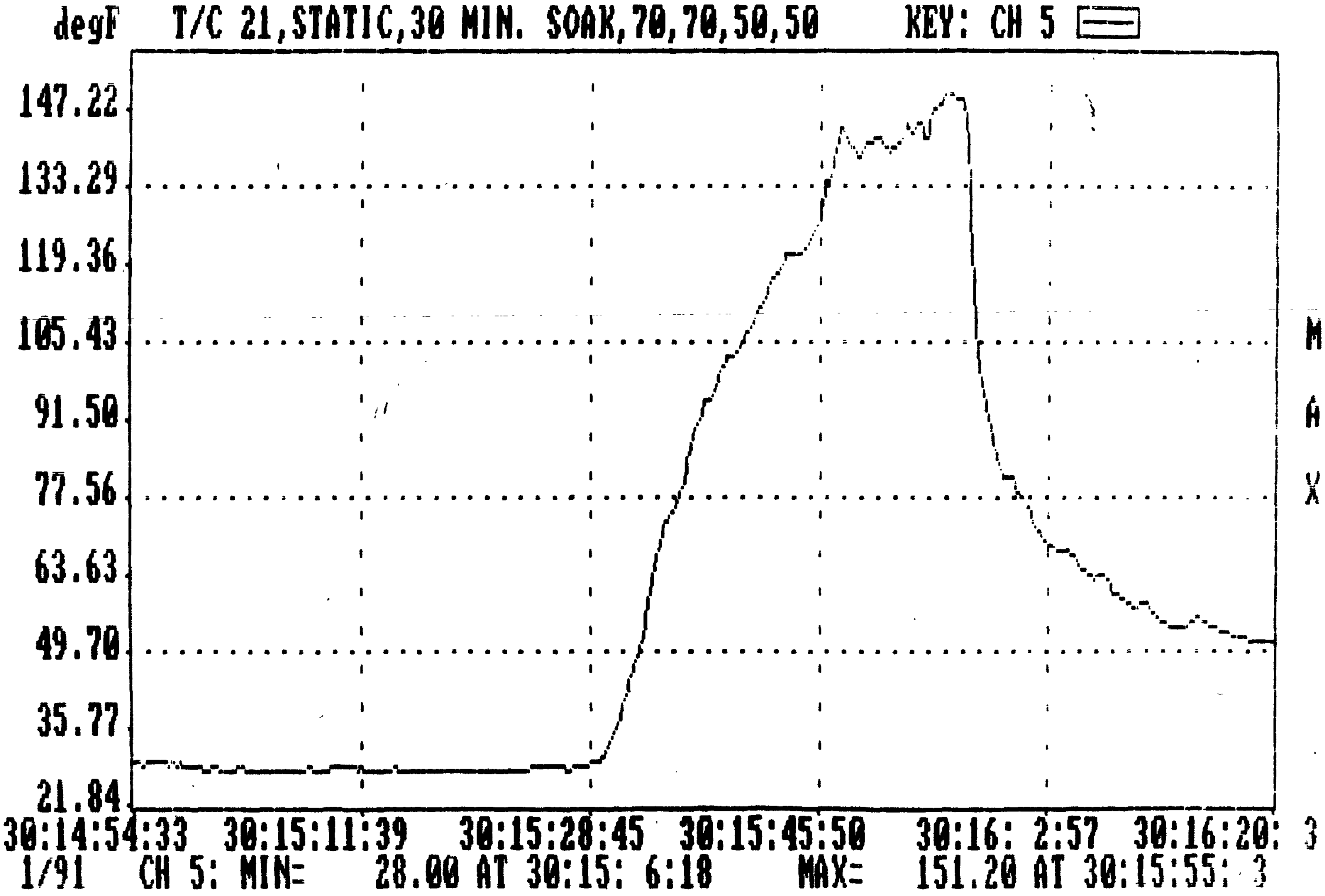

degF
T/C 21,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 5
147.22
133.29
119.36
105.43
91.50
77.56
63.63
49.70
35.77
21.84
M
A
X
30:14:54:33
30:15:11:39
30:15:28:45
30:15:45:50
30:16: 2:57
30:16:20: 3
1/91
CH 5: MIN= 28.00 AT 30:15: 6:18
MAX= 151.20 AT 30:15:55: 3

Figure 23.

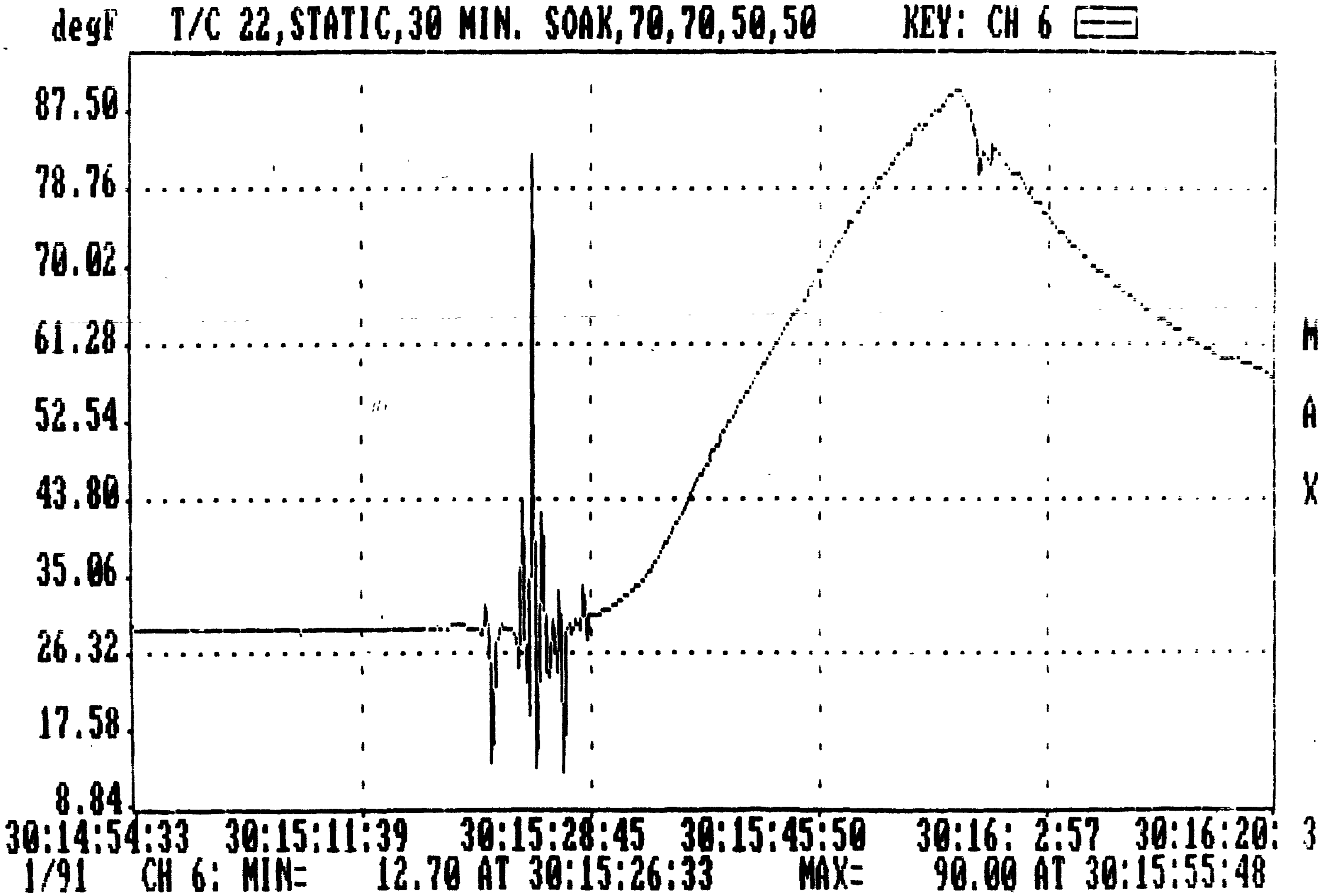

degF
T/C 22,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 6
87.50
78.76
70.02
61.28
52.54
43.80
35.06
26.32
17.58
8.84
MAX
30:14:54:33
30:15:11:39
30:15:28:45
30:15:45:50
30:16: 2:57
30:16:20: 3
1/91
CH 6: MIN= 12.70 AT 30:15:26:33
MAX= 90.00 AT 30:15:55:48

Figure 24.

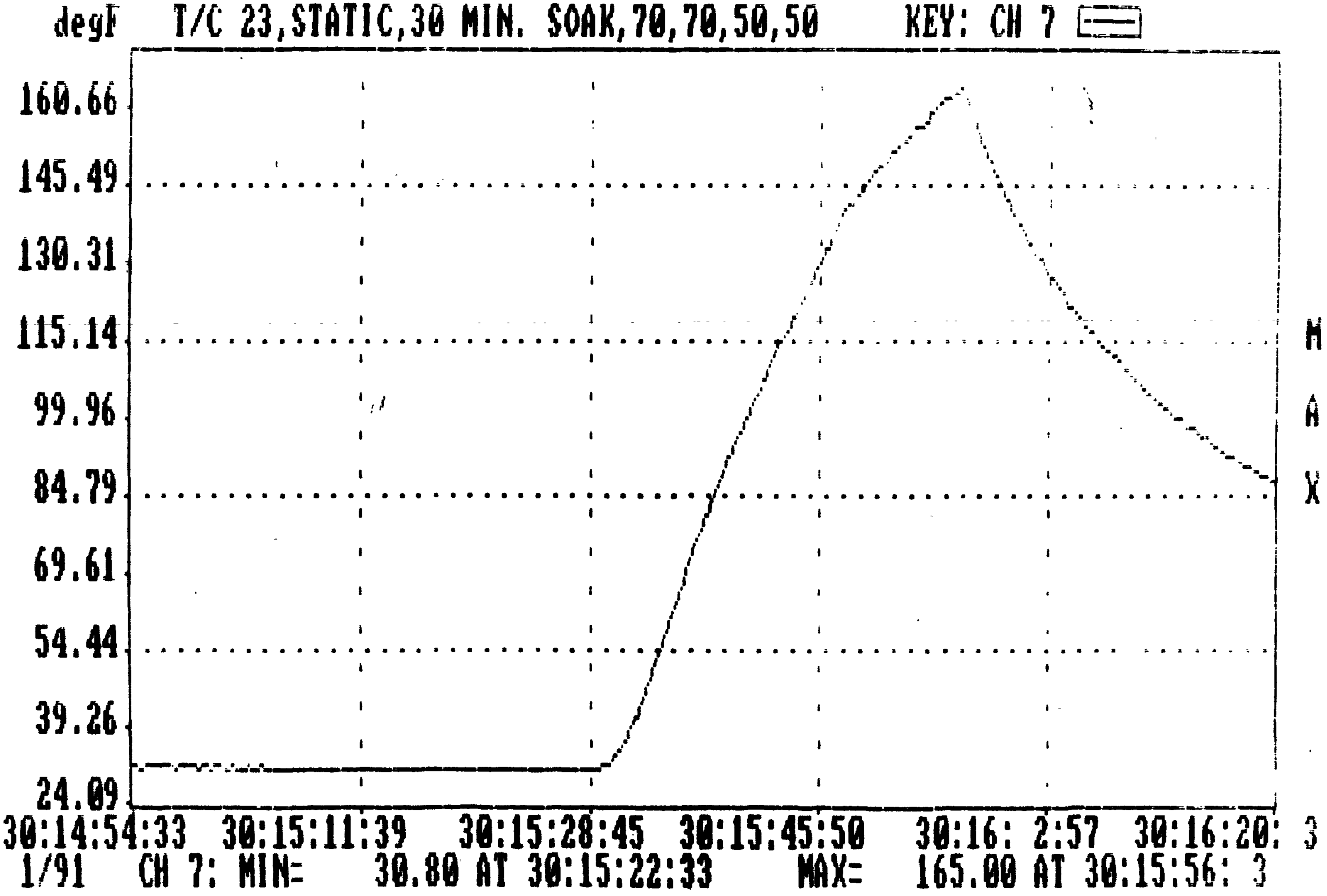

degF
T/C 23,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 7
160.66
145.49
130.31
115.14
99.96
84.79
69.61
54.44
39.26
24.09
30:14:54:33
30:15:11:39
30:15:28:45
30:15:45:50
30:16: 2:57
30:16:20: 3
1/91
CH 7: MIN= 30.80 AT 30:15:22:33
MAX= 165.00 AT 30:15:56: 3
M
A
X

Figure 25.

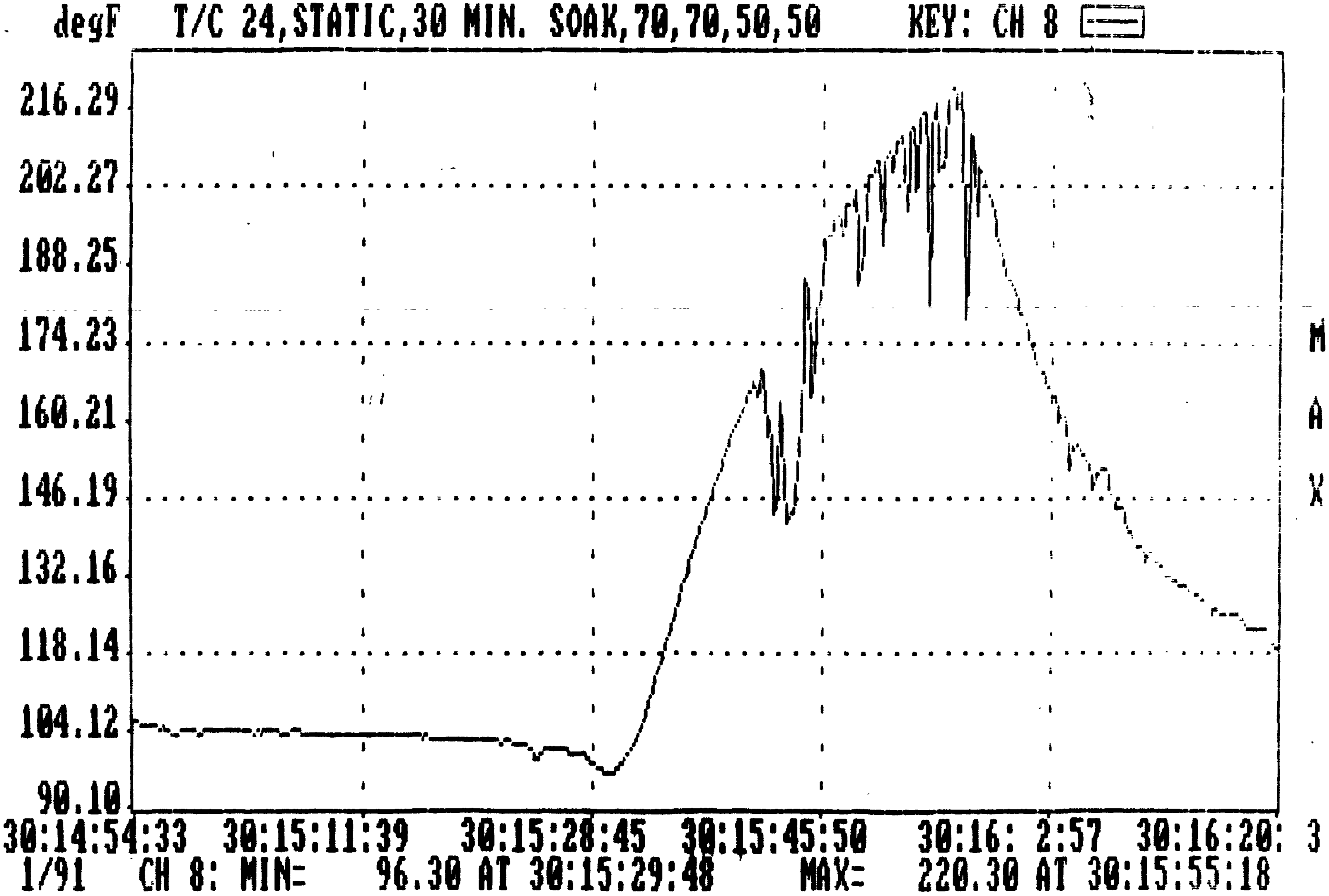
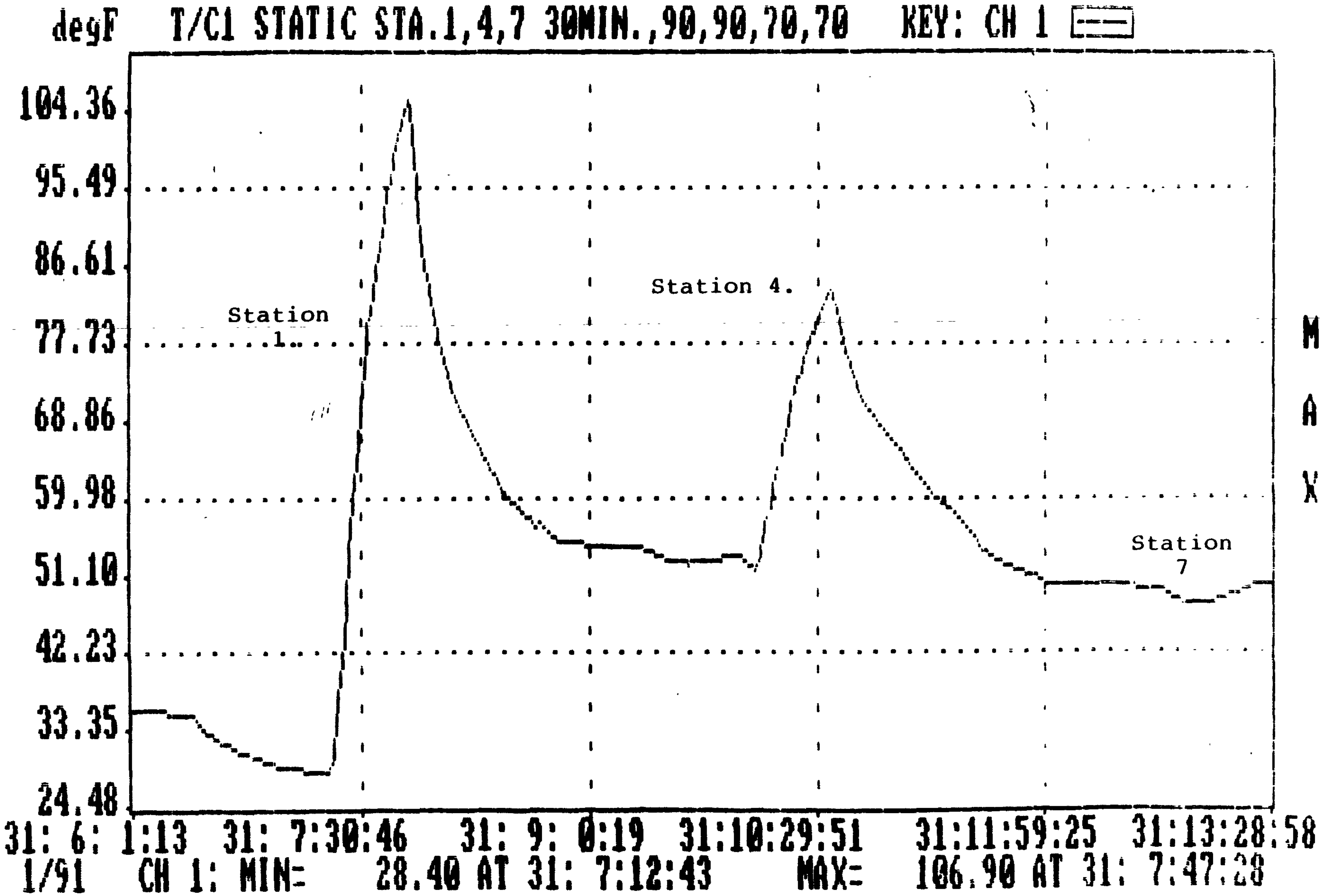

degF
T/C 24,STATIC,30 MIN. SOAK,70,70,50,50
KEY: CH 8
216.29
202.27
188.25
174.23
160.21
146.19
132.16
118.14
104.12
90.10
MAX
30:14:54:33
30:15:11:39
30:15:28:45
30:15:45:50
30:16: 2:57
30:16:20: 3
1/91 CH 8: MIN= 96.30 AT 30:15:29:48 MAX= 220.30 AT 30:15:55:18

Figure 26.



degF T/C1 STATIC STA.1,4,7 30MIN.,90,90,70,70 KEY: CH 1
104.36
95.49
86.61
77.73
68.86
59.98
51.10
42.23
33.35
24.48
Station 1.
Station 4.
Station 7
MAX
31: 6: 1:13 31: 7:30:46 31: 9: 0:19 31:10:29:51 31:11:59:25 31:13:28:58
1/91 CH 1: MIN= 28.40 AT 31: 7:12:43 MAX= 106.90 AT 31: 7:47:28

Figure 27.

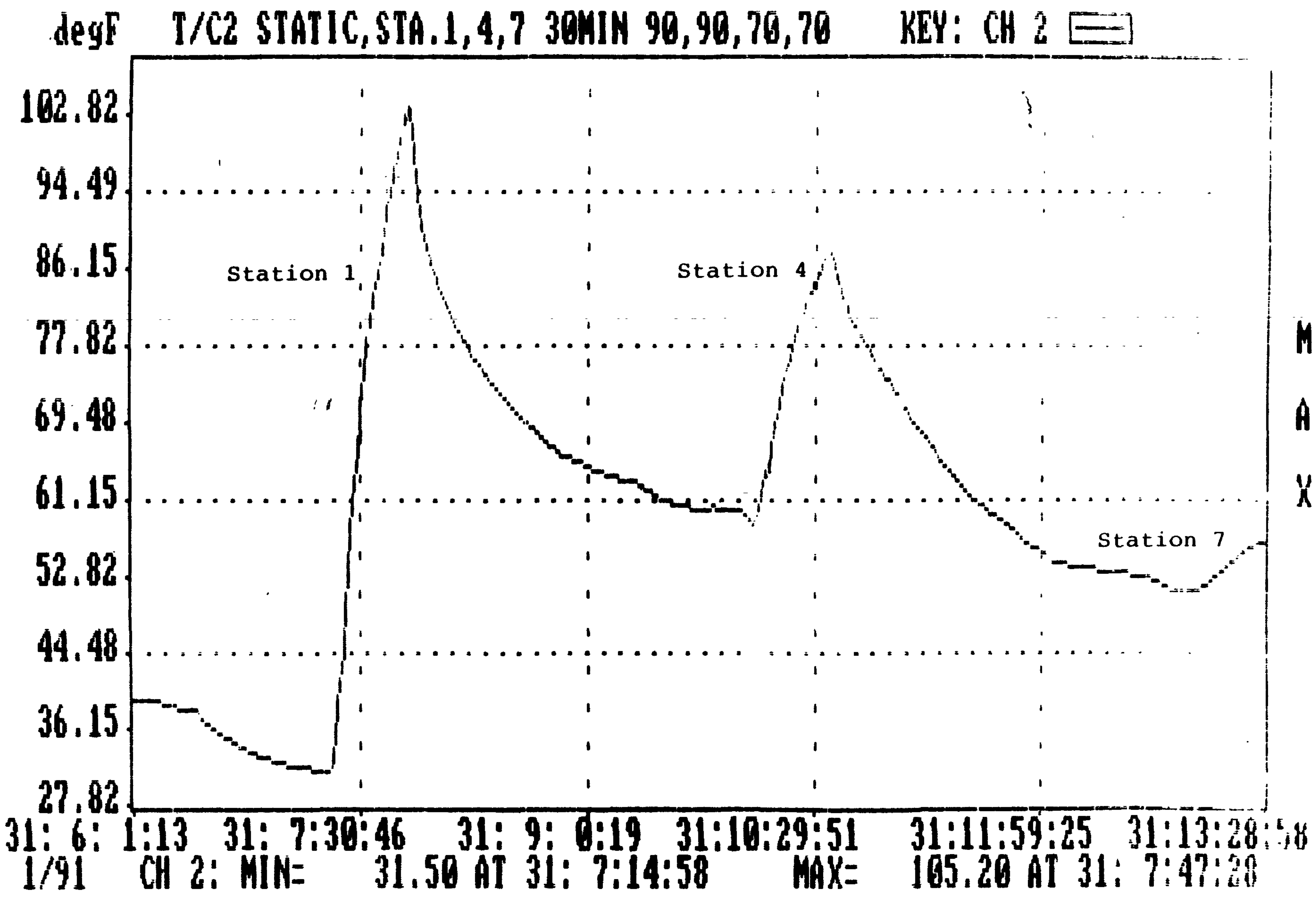

degF
T/C2 STATIC,STA.1,4,7 30MIN 90,90,70,70
KEY: CH 2
MAX
102.82
94.49
86.15
77.82
69.48
61.15
52.82
44.48
36.15
27.82
Station 1
Station 4
Station 7
31: 6: 1:13
31: 7:30:46
31: 9: 0:19
31:10:29:51
31:11:59:25
31:13:28:58
1/91
CH 2: MIN= 31.50 AT 31: 7:14:58
MAX= 105.20 AT 31: 7:47:28

Figure 28.

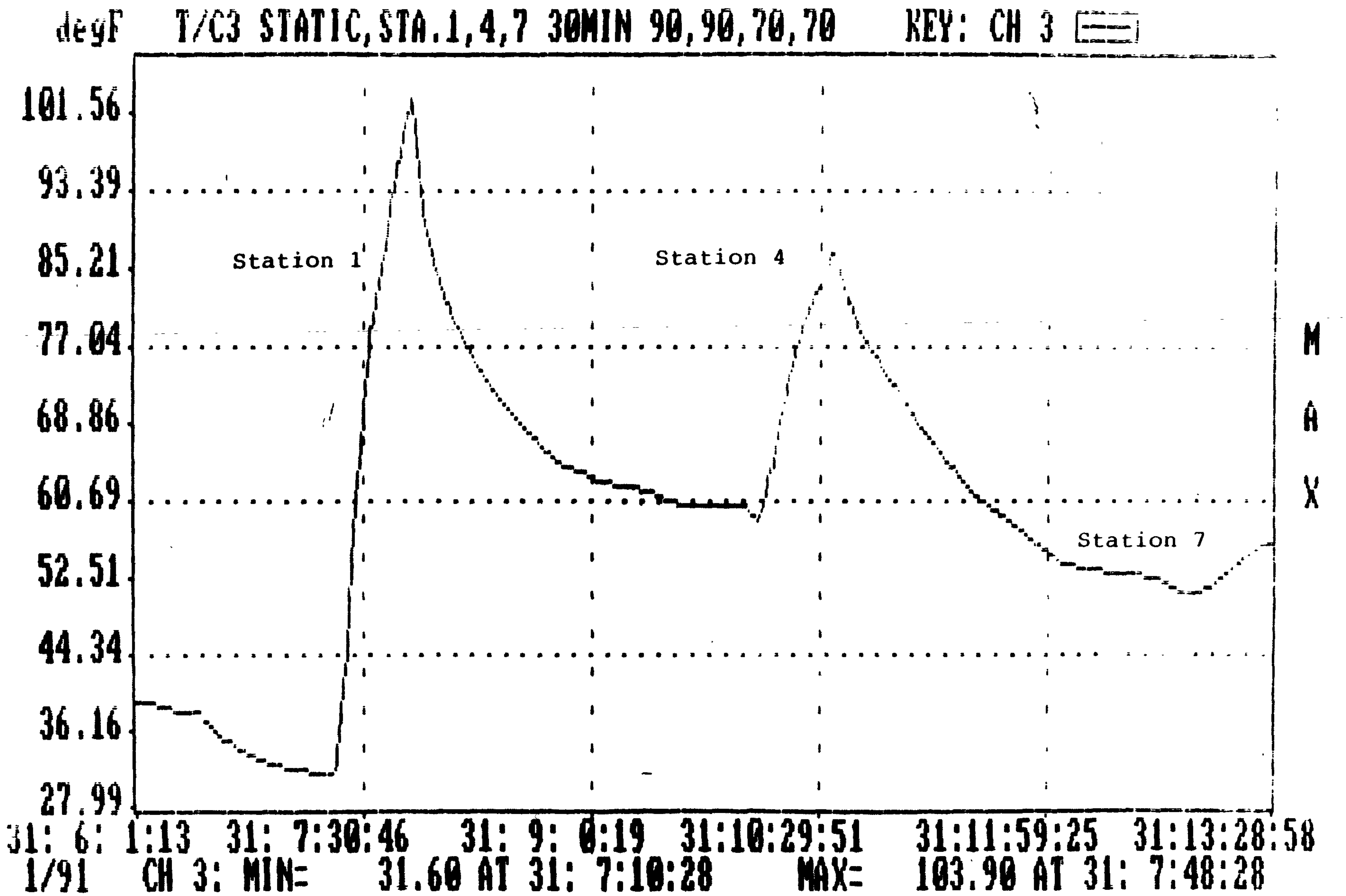

degF
T/C3 STATIC,STA.1,4,7 30MIN 90,90,70,70
KEY: CH 3
101.56
93.39
85.21
77.04
68.86
60.69
52.51
44.34
36.16
27.99
Station 1
Station 4
Station 7
M
A
X
31: 6: 1:13
31: 7:30:46
31: 9: 0:19
31:10:29:51
31:11:59:25
31:13:28:58
1/91
CH 3: MIN= 31.60 AT 31: 7:10:28
MAX= 103.90 AT 31: 7:48:28

Figure 29.

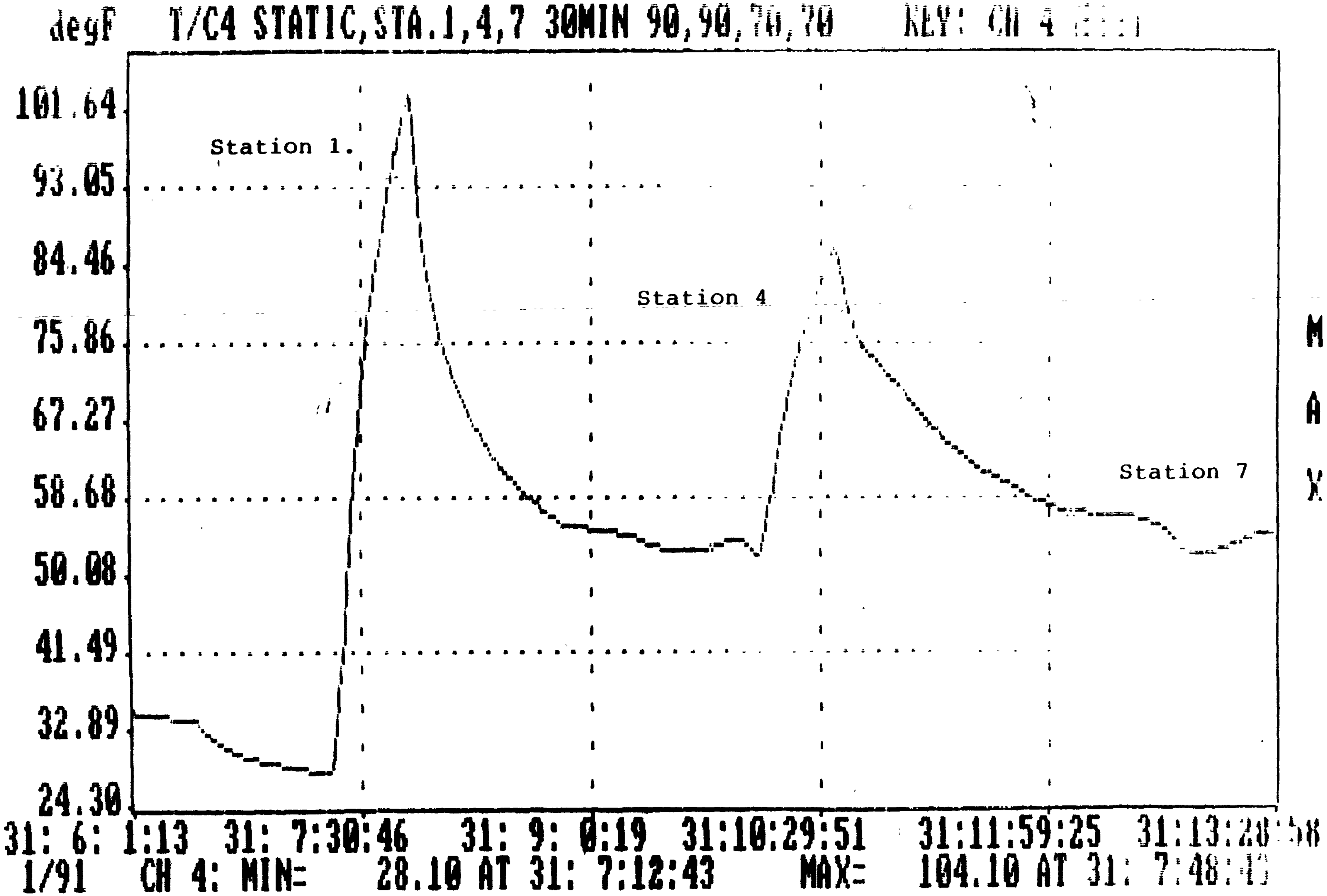


Figure 30.

IP12_002210

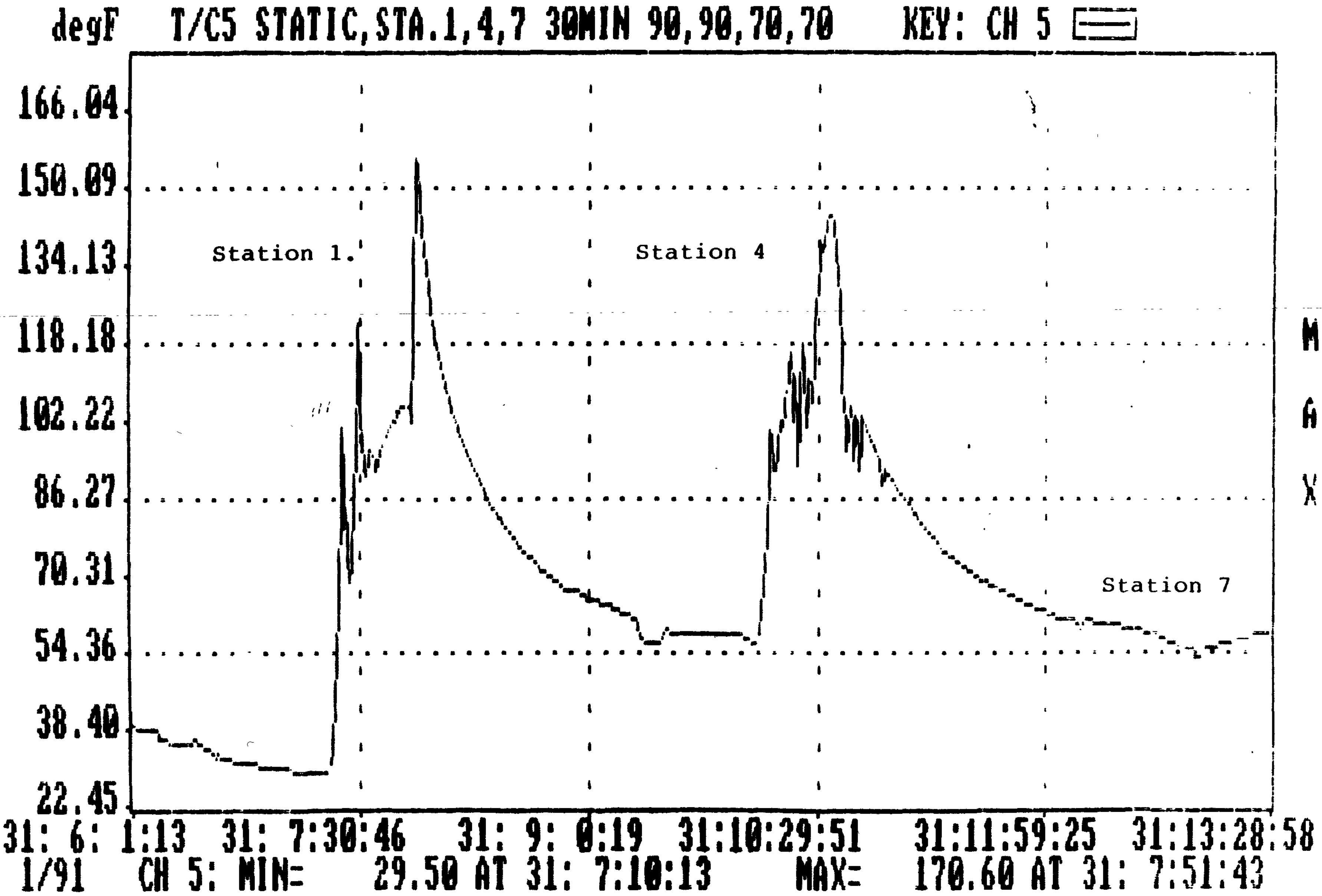

degF
T/C5 STATIC,STA.1,4,7 30MIN 90,90,70,70
KEY: CH 5
166.04
150.09
134.13
118.18
102.22
86.27
70.31
54.36
38.40
22.45
Station 1.
Station 4
Station 7
MAX
31: 6: 1:13
31: 7:30:46
31: 9: 0:19
31:10:29:51
31:11:59:25
31:13:28:58
1/91
CH 5: MIN= 29.50 AT 31: 7:10:13
MAX= 170.60 AT 31: 7:51:43

Figure 31.

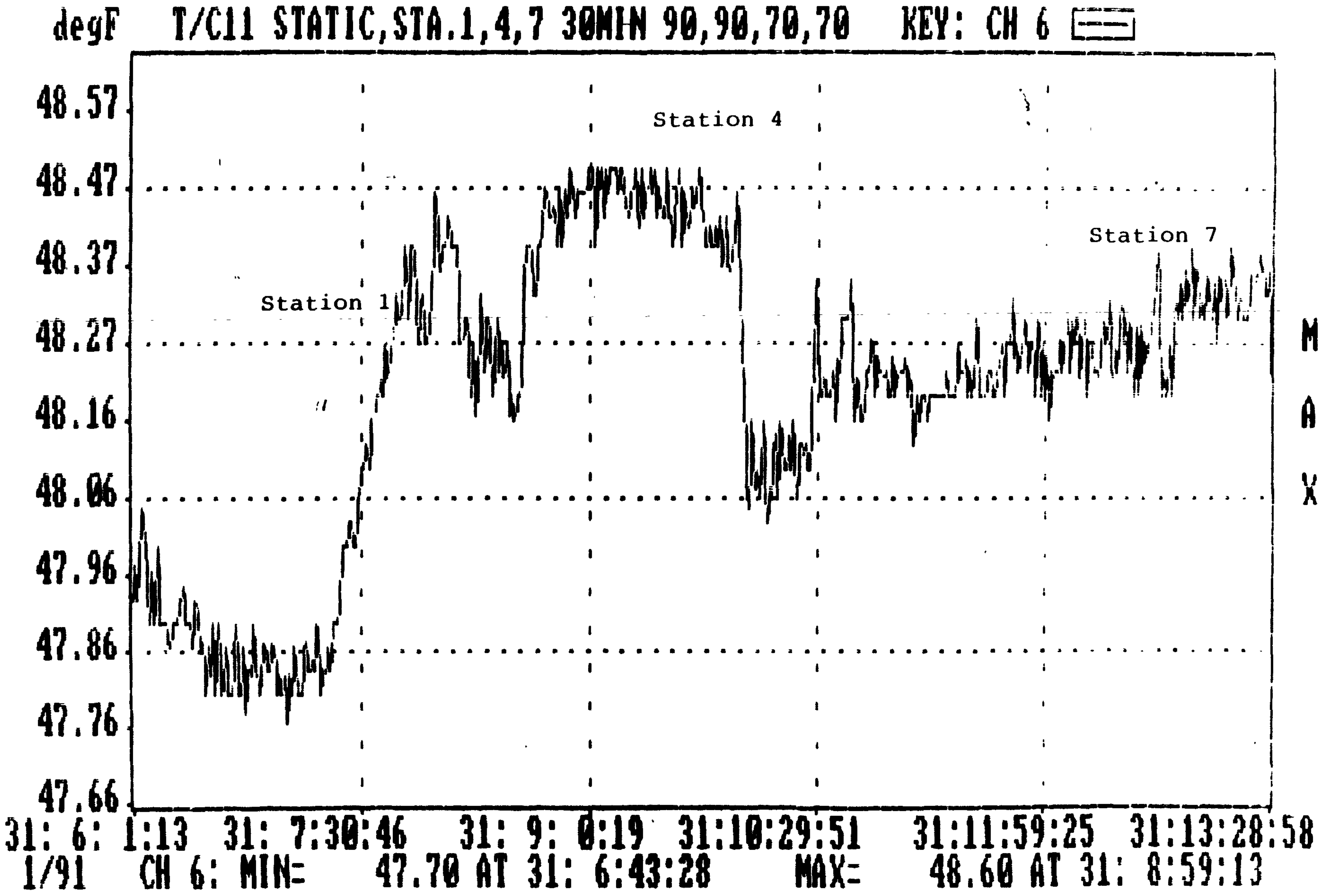

degF
T/C11 STATIC,STA.1,4,7 30MIN 90,90,70,70
KEY: CH 6
48.57
48.47
48.37
48.27
48.16
48.06
47.96
47.86
47.76
47.66
Station 1
Station 4
Station 7
MAX
31: 6: 1:13
31: 7:30:46
31: 9: 0:19
31:10:29:51
31:11:59:25
31:13:28:58
1/91
CH 6: MIN= 47.70 AT 31: 6:43:28
MAX= 48.60 AT 31: 8:59:13

Figure 32.

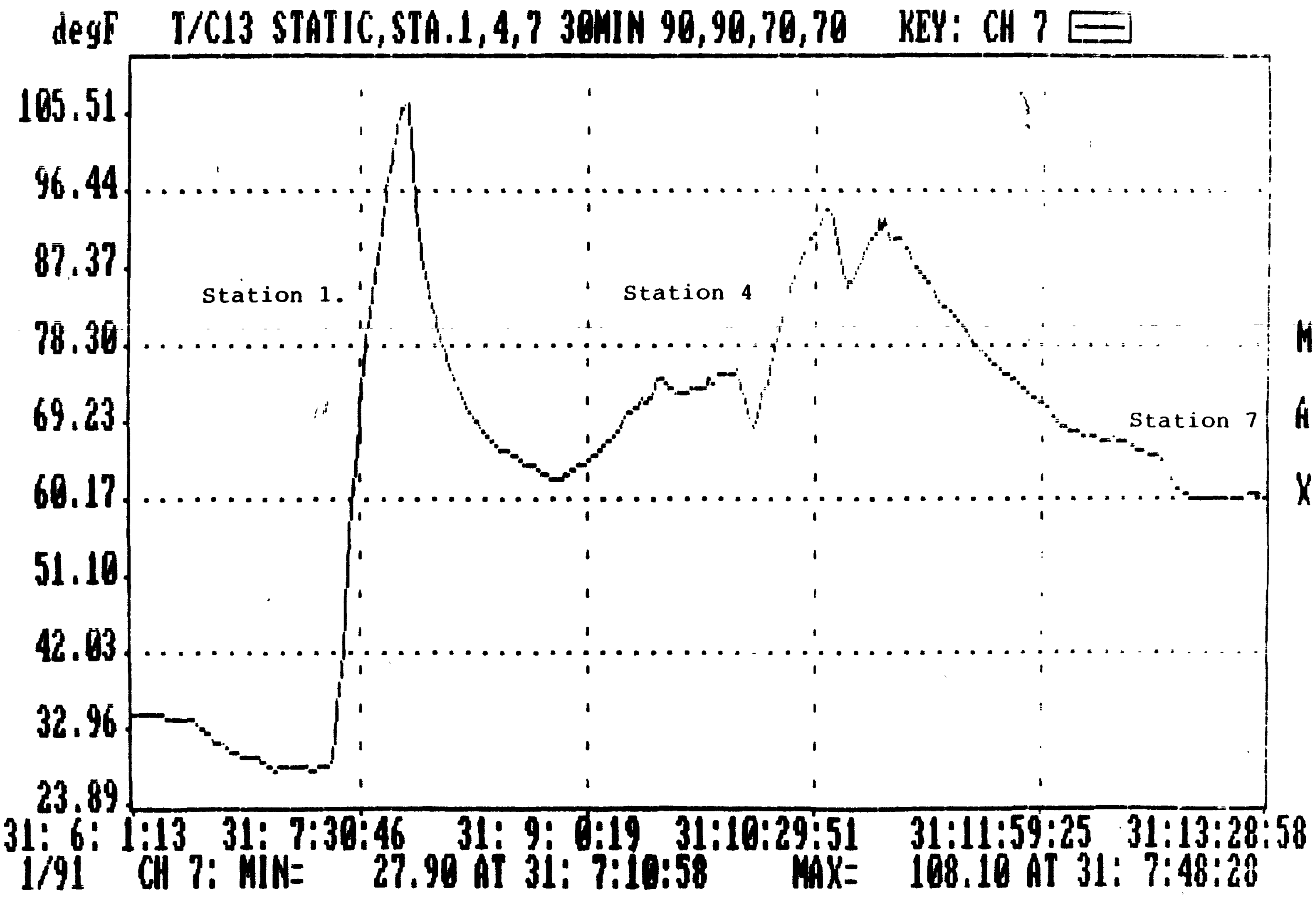

degF
T/C13 STATIC,STA.1,4,7 30MIN 90,90,70,70
KEY: CH 7
105.51
96.44
87.37
78.30
69.23
60.17
51.10
42.03
32.96
23.89
Station 1.
Station 4
Station 7
MAX
31: 6: 1:13
31: 7:30:46
31: 9: 0:19
31:10:29:51
31:11:59:25
31:13:28:58
1/91
CH 7: MIN= 27.90 AT 31: 7:10:58
MAX= 108.10 AT 31: 7:48:28

Figure 33.

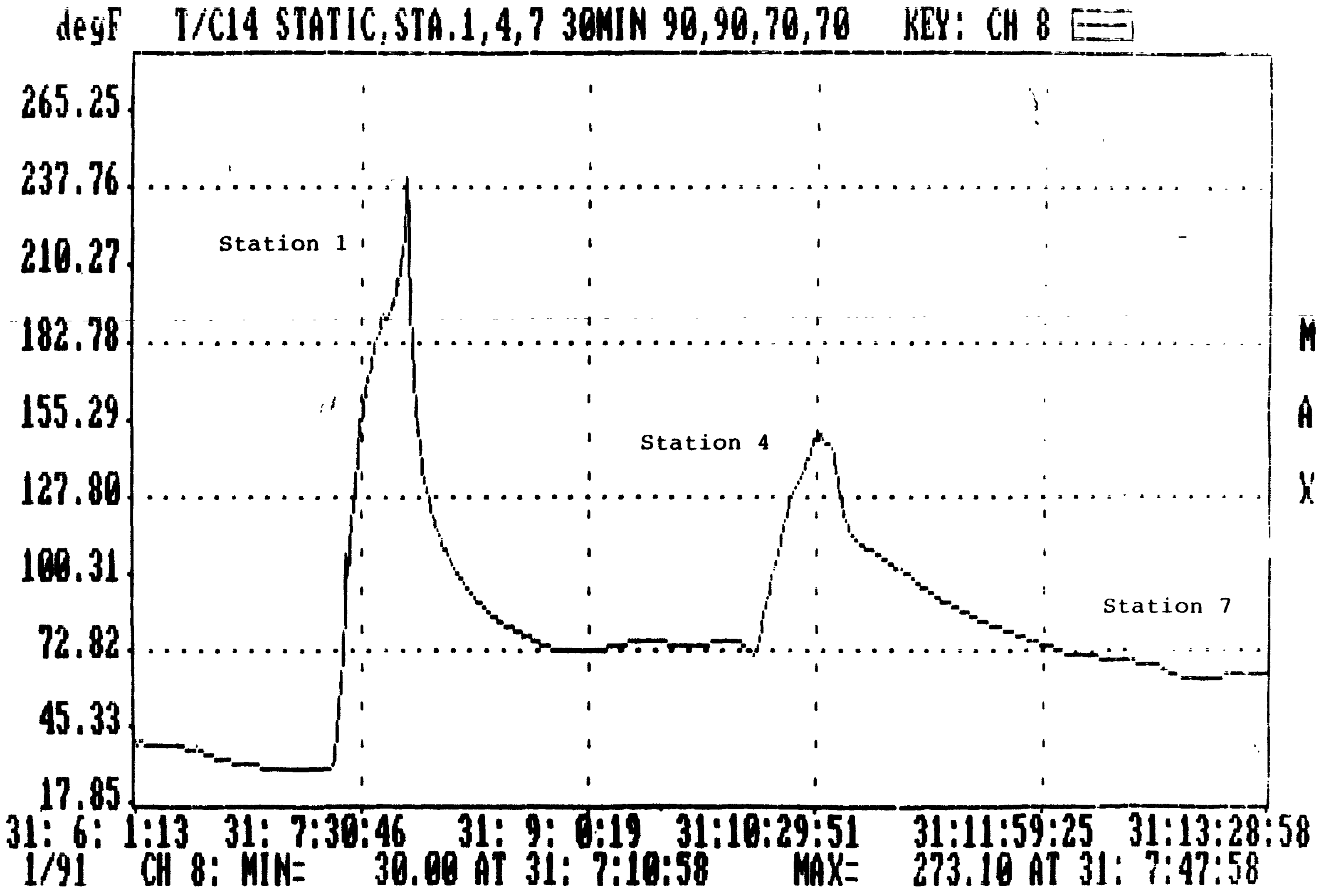

degF
T/C14 STATIC,STA.1,4,7 30MIN 90,90,70,70
KEY: CH 8
265.25
237.76
210.27
182.78
155.29
127.80
100.31
72.82
45.33
17.85
Station 1
Station 4
Station 7
M
A
X
31: 6: 1:13
31: 7:30:46
31: 9: 0:19
31:10:29:51
31:11:59:25
31:13:28:58
1/91
CH 8: MIN= 30.00 AT 31: 7:10:58
MAX= 273.10 AT 31: 7:47:58

Figure 34.

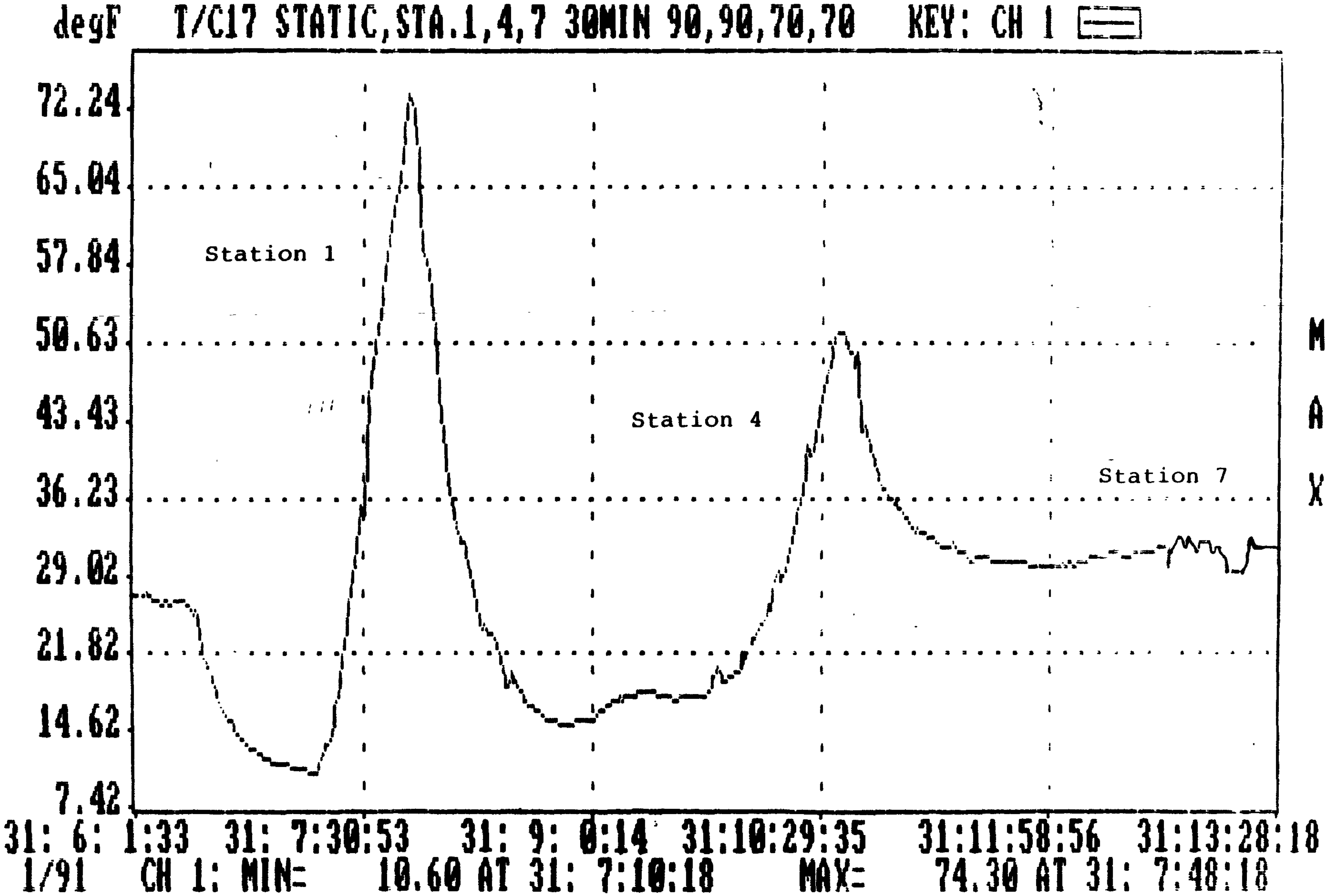


Figure 35.

IP12_002215

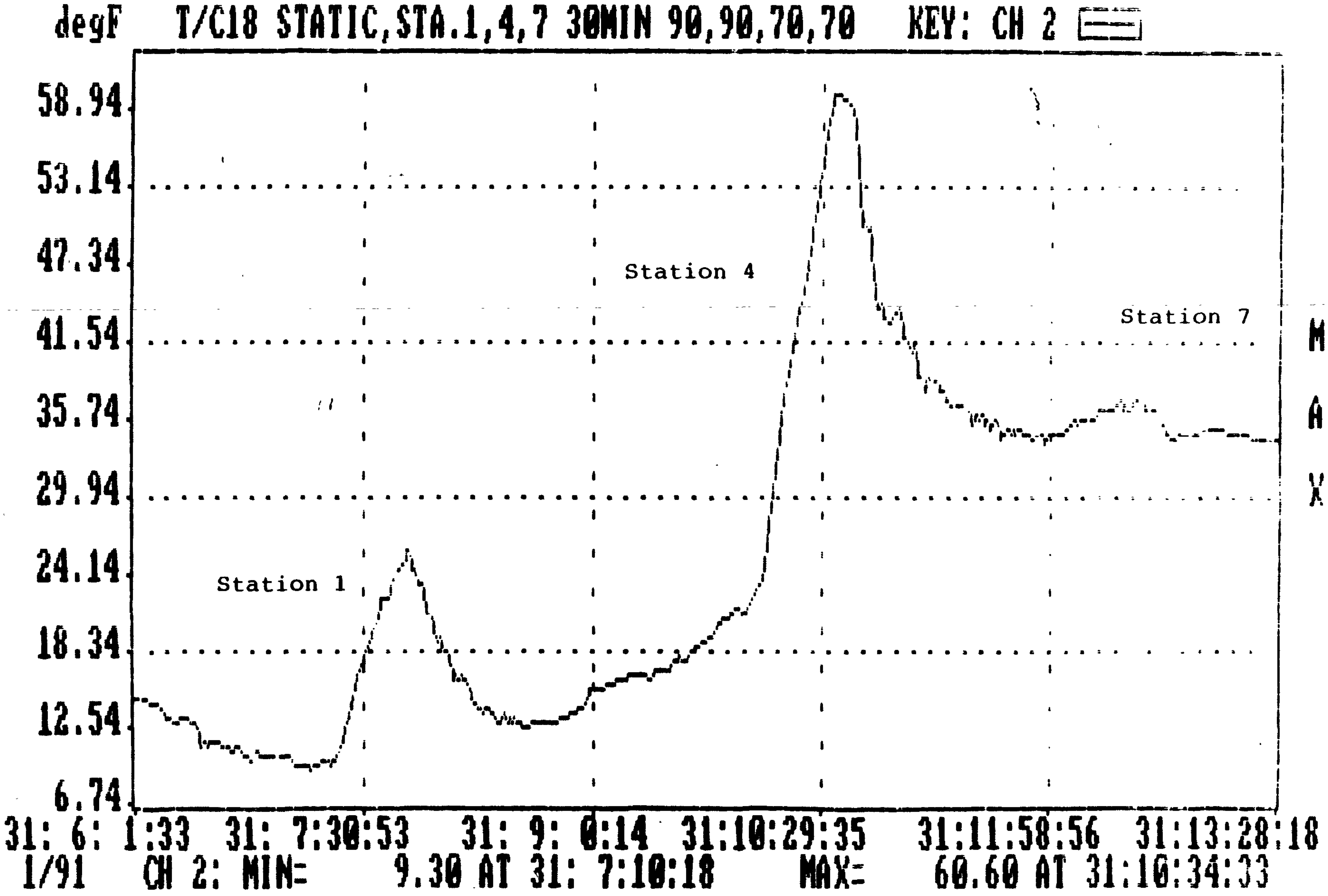

degF
T/C18 STATIC,STA.1,4,7 30MIN 90,90,70,70
KEY: CH 2
58.94
53.14
47.34
41.54
35.74
29.94
24.14
18.34
12.54
6.74
Station 1
Station 4
Station 7
MAX
31: 6: 1:33
1/91
31: 7:30:53
31: 9: 0:14
31:10:29:35
31:11:58:56
31:13:28:18
CH 2: MIN= 9.30 AT 31: 7:10:18
MAX= 60.60 AT 31:10:34:33

Figure 36.

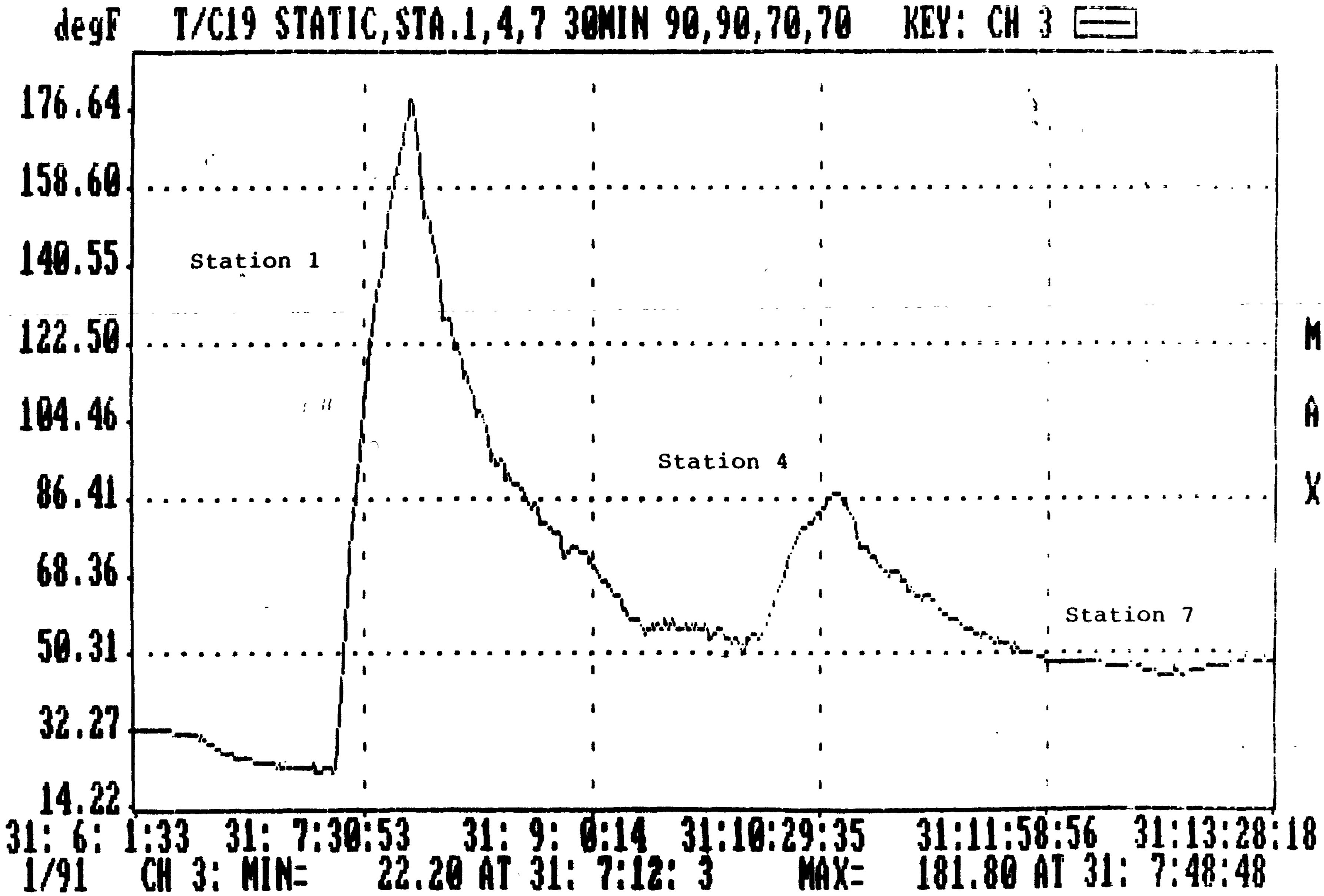

degF T/C19 STATIC,STA.1,4,7 30MIN 90,90,70,70 KEY: CH 3
176.64
158.60
140.55
122.50
104.46
86.41
68.36
50.31
32.27
14.22
Station 1
Station 4
Station 7
MAX
31: 6: 1:33 31: 7:30:53 31: 9: 0:14 31:10:29:35 31:11:58:56 31:13:28:18
1/91 CH 3: MIN= 22.20 AT 31: 7:12: 3 MAX= 181.80 AT 31: 7:48:48

Figure 37.

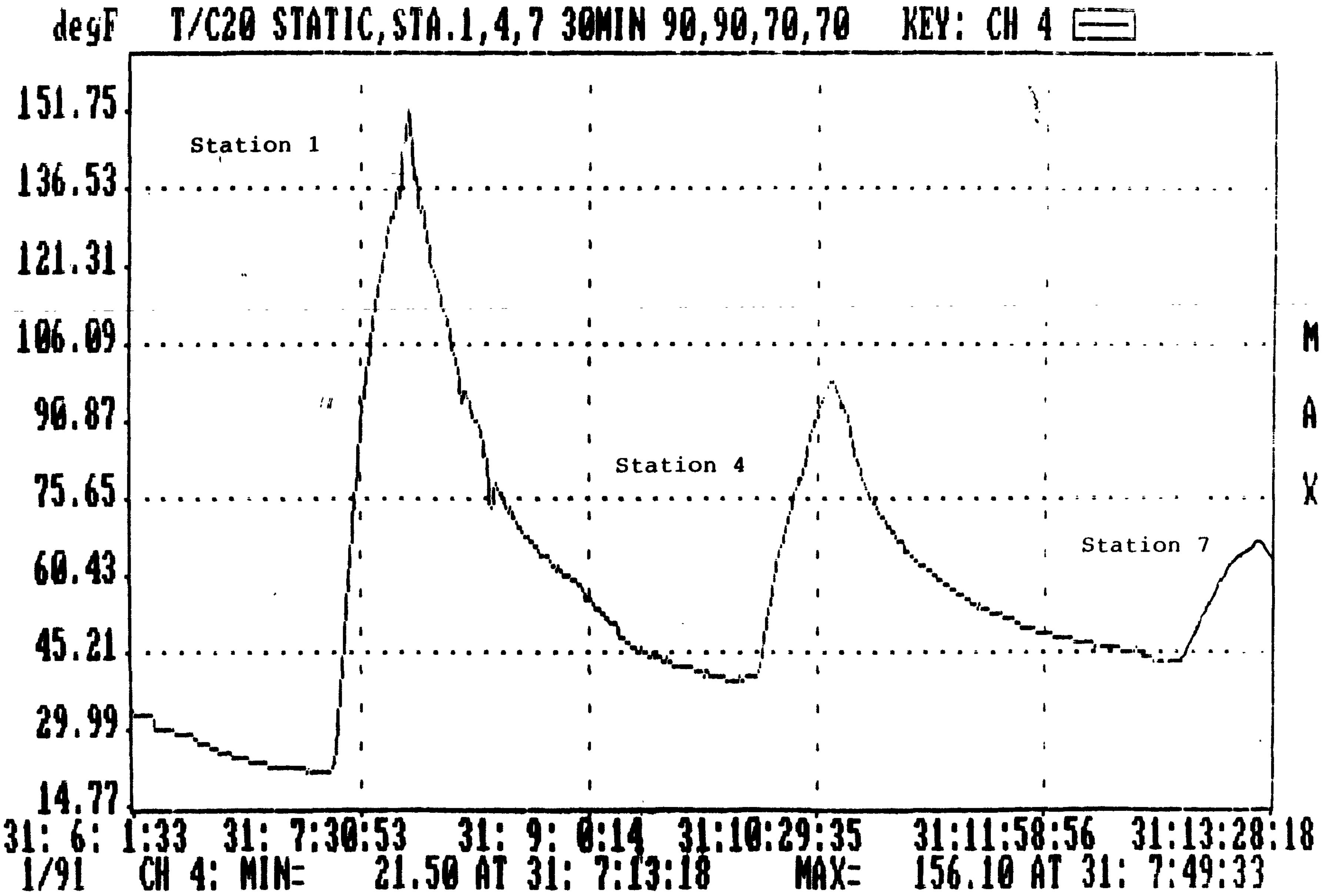


Figure 38.

IP12_002218

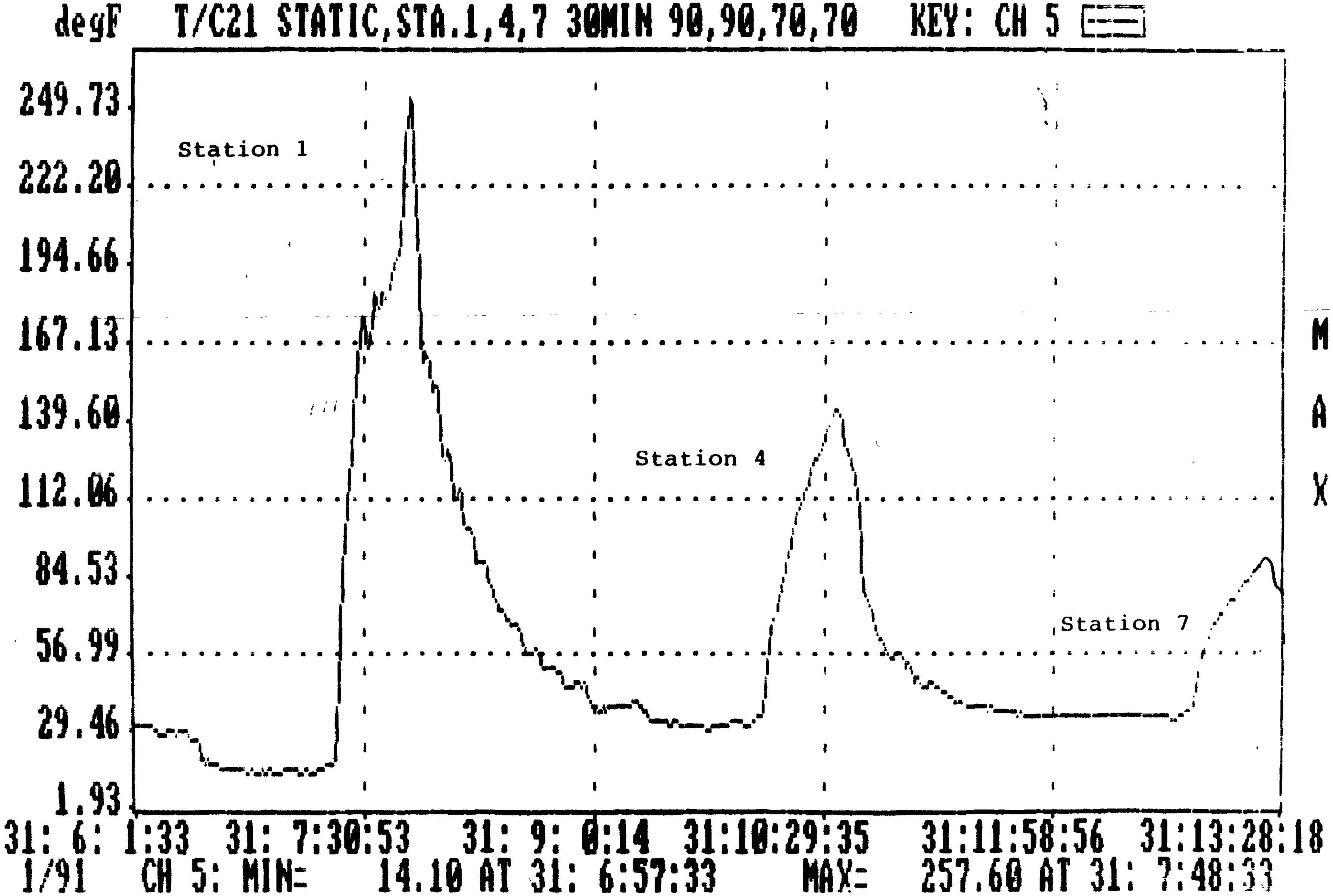

degF T/C21 STATIC,STA.1,4,7 30MIN 90,90,70,70 KEY: CH 5
249.73
222.20
194.66
167.13
139.60
112.06
84.53
56.99
29.46
1.93
Station 1
Station 4
Station 7
MAX
31: 6: 1:33 31: 7:30:53 31: 9: 0:14 31:10:29:35 31:11:58:56 31:13:28:18
1/91 CH 5: MIN= 14.10 AT 31: 6:57:33 MAX= 257.60 AT 31: 7:48:33

Figure 39.

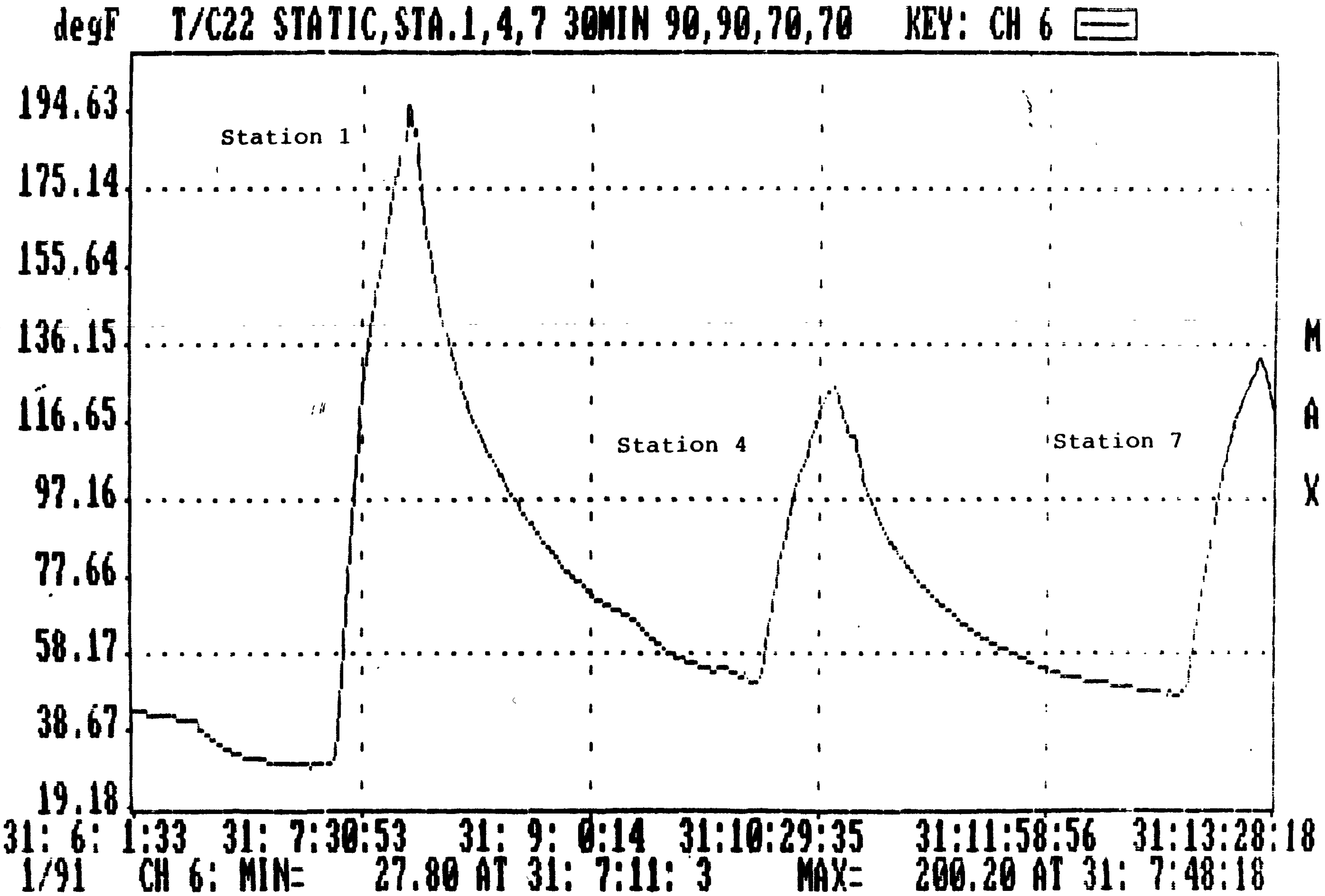
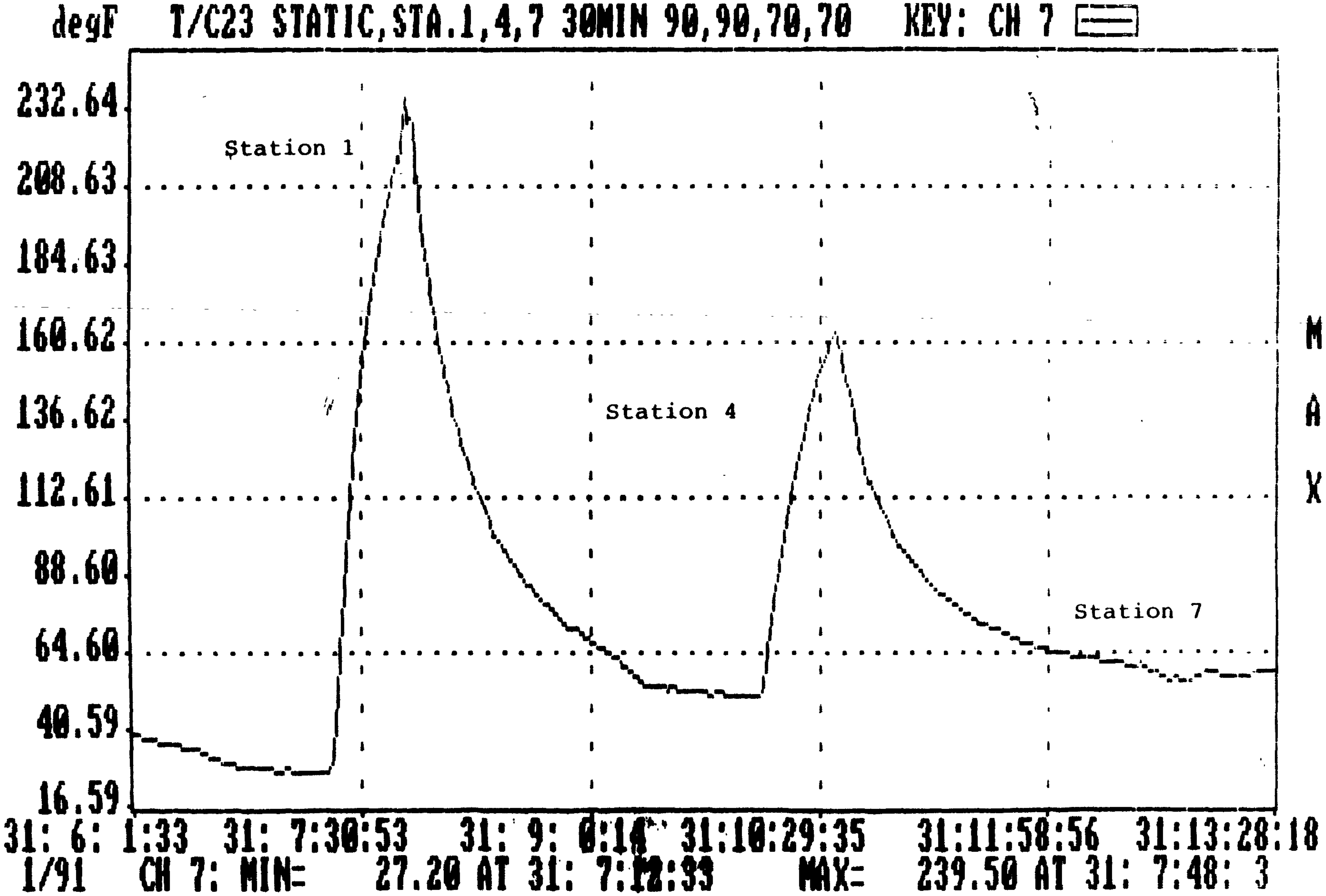

degF T/C22 STATIC,STA.1,4,7 30MIN 90,90,70,70 KEY: CH 6
194.63
175.14
155.64
136.15
116.65
97.16
77.66
58.17
38.67
19.18
Station 1
Station 4
Station 7
MAX
31: 6: 1:33 31: 7:30:53 31: 9: 0:14 31:10:29:35 31:11:58:56 31:13:28:18
1/91 CH 6: MIN= 27.80 AT 31: 7:11: 3 MAX= 200.20 AT 31: 7:48:18

Figure 40.



degF T/C23 STATIC,STA.1,4,7 30MIN 90,90,70,70 KEY: CH 7
232.64
208.63
184.63
160.62
136.62
112.61
88.60
64.60
40.59
16.59
Station 1
Station 4
Station 7
MAX
31: 6: 1:33 31: 7:30:53 31: 9: 0:14 31:10:29:35 31:11:58:56 31:13:28:18
1/91 CH 7: MIN= 27.20 AT 31: 7:12:33 MAX= 239.50 AT 31: 7:48: 3

Figure 41.

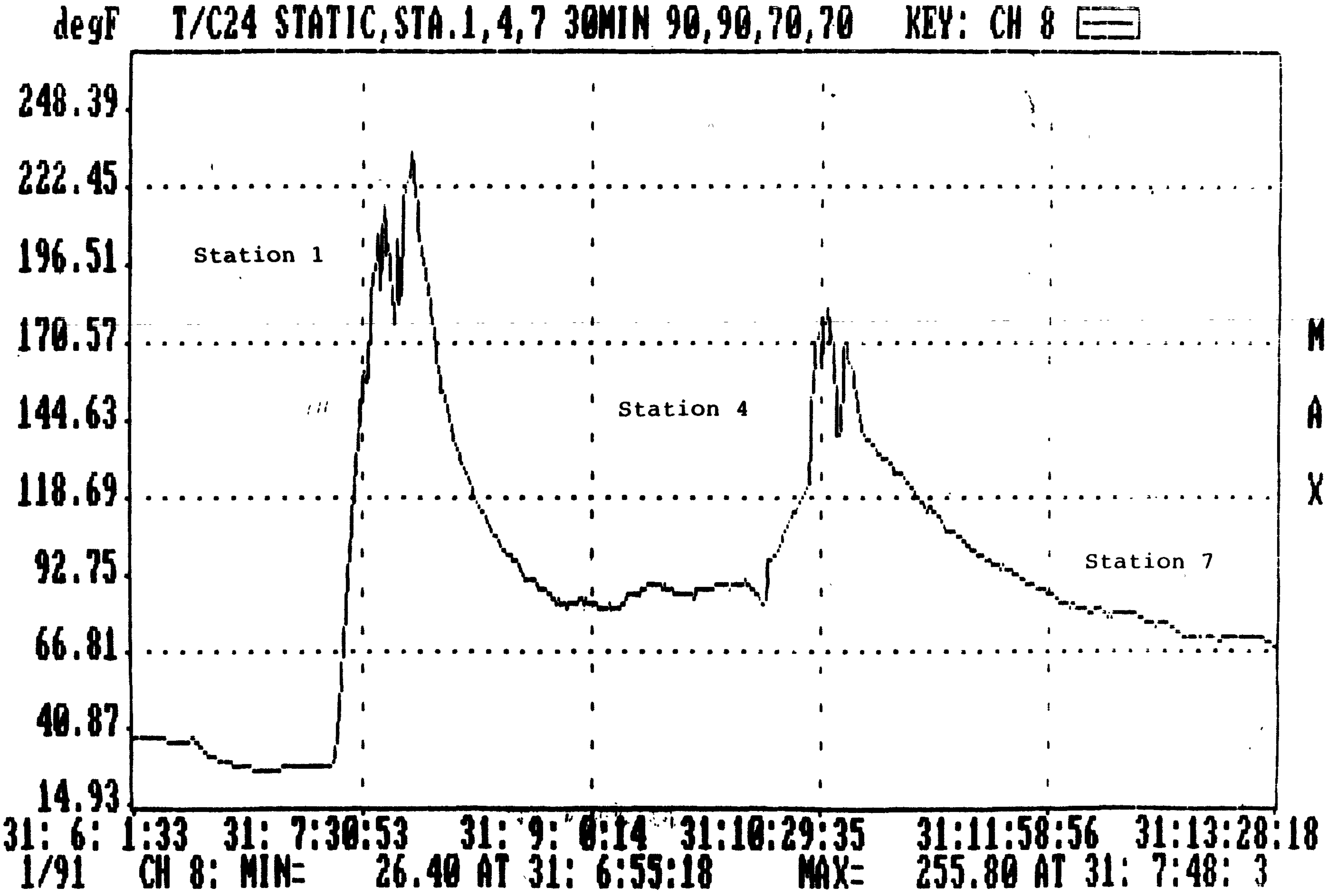
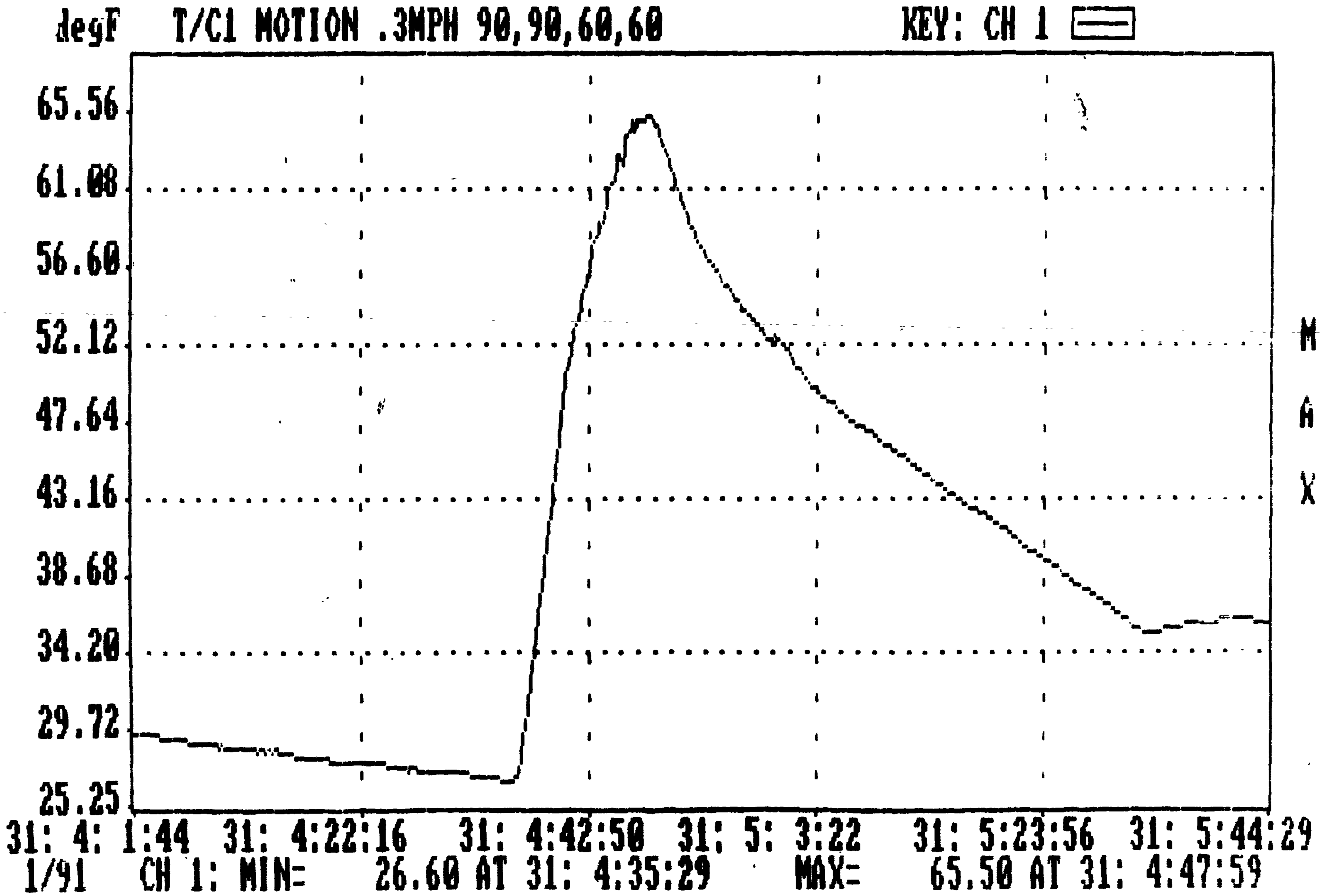

degF
T/C24 STATIC,STA.1,4,7 30MIN 90,90,70,70
KEY: CH 8
248.39
222.45
196.51
170.57
144.63
118.69
92.75
66.81
40.87
14.93
Station 1
Station 4
Station 7
M
A
X
31: 6: 1:33
31: 7:30:53
31: 9: 0:14
31:10:29:35
31:11:58:56
31:13:28:18
1/91
CH 8: MIN= 26.40 AT 31: 6:55:18
MAX= 255.80 AT 31: 7:48: 3

Figure 42.



degF
T/C1 MOTION .3MPH 90,90,60,60
KEY: CH 1
65.56
61.08
56.60
52.12
47.64
43.16
38.68
34.20
29.72
25.25
M
A
X
31: 4: 1:44
31: 4:22:16
31: 4:42:50
31: 5: 3:22
31: 5:23:56
31: 5:44:29
1/91
CH 1: MIN= 26.60 AT 31: 4:35:29
MAX= 65.50 AT 31: 4:47:59

Figure 43.

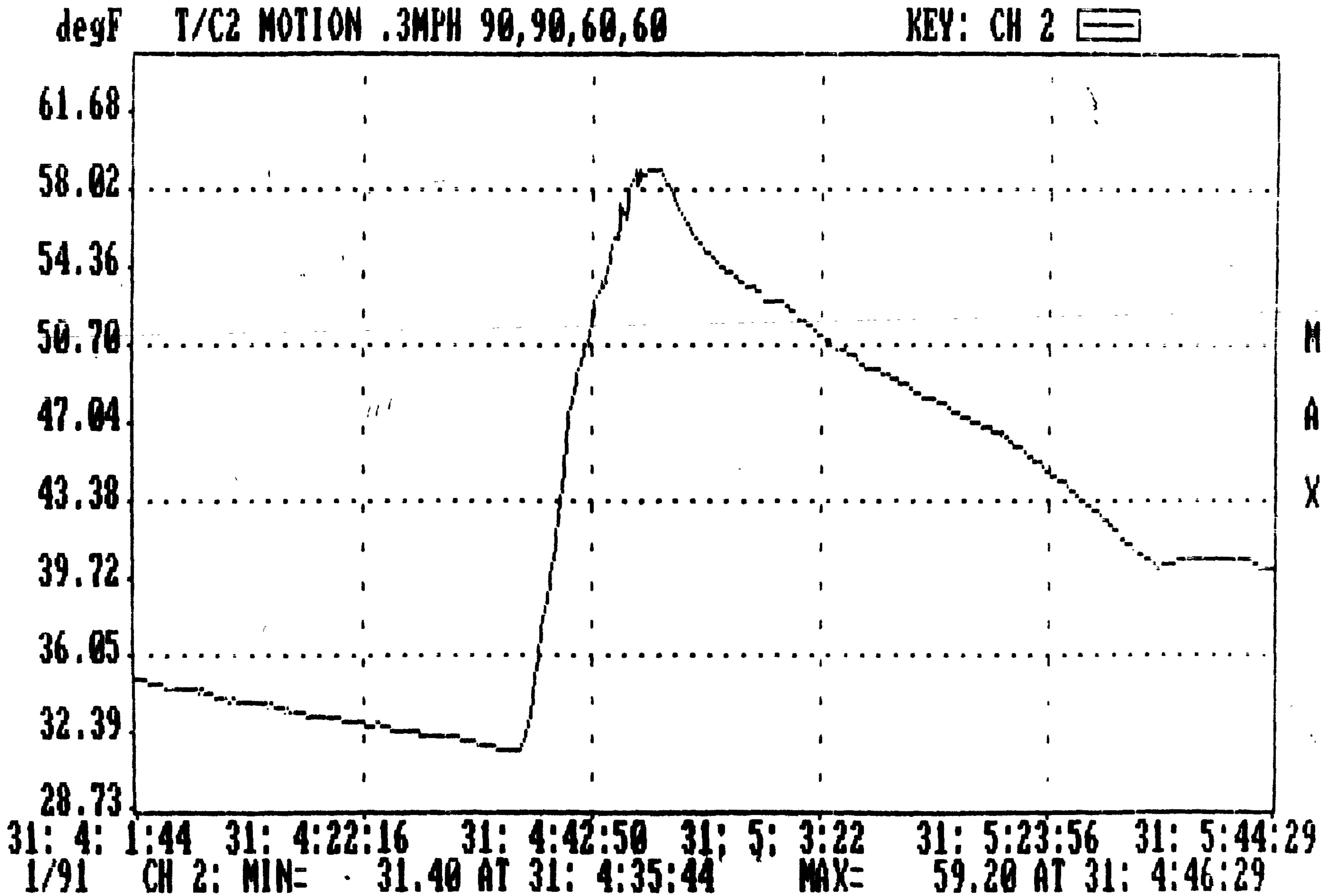

degF
T/C2 MOTION .3MPH 90,90,60,60
KEY: CH 2
61.68
58.02
54.36
50.70
47.04
43.38
39.72
36.05
32.39
28.73
MAX
31: 4: 1:44
31: 4:22:16
31: 4:42:50
31: 5: 3:22
31: 5:23:56
31: 5:44:29
1/91
CH 2: MIN= 31.40 AT 31: 4:35:44
MAX= 59.20 AT 31: 4:46:29

Figure 44.

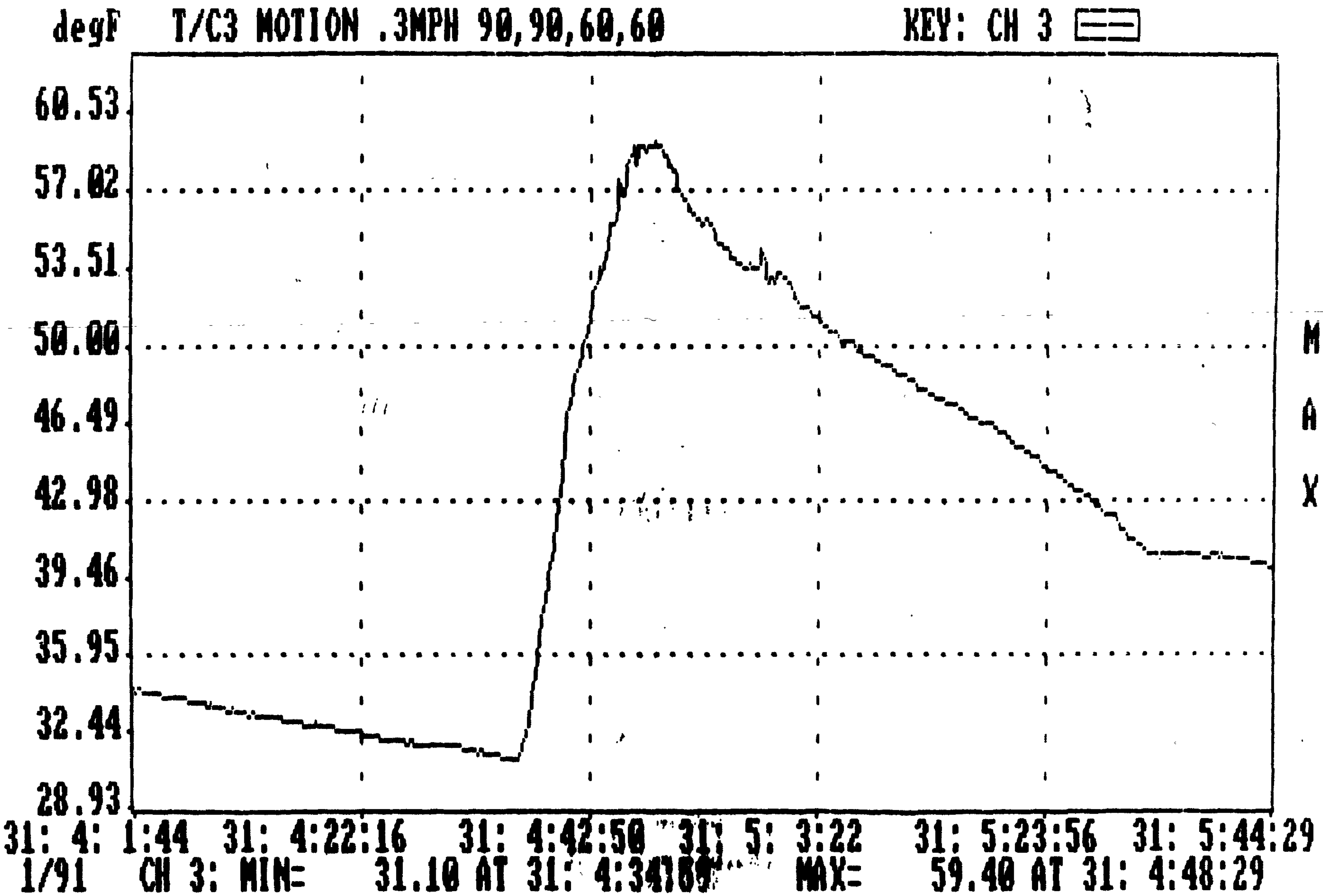

degF T/C3 MOTION .3MPH 90,90,60,60
KEY: CH 3
60.53
57.02
53.51
50.00
46.49
42.98
39.46
35.95
32.44
28.93
MAX
31: 4: 1:44
1/91
31: 4:22:16
31: 4:42:50
31: 5: 3:22
31: 5:23:56
31: 5:44:29
CH 3: MIN= 31.10 AT 31: 4:34
MAX= 59.40 AT 31: 4:48:29

Figure 45.

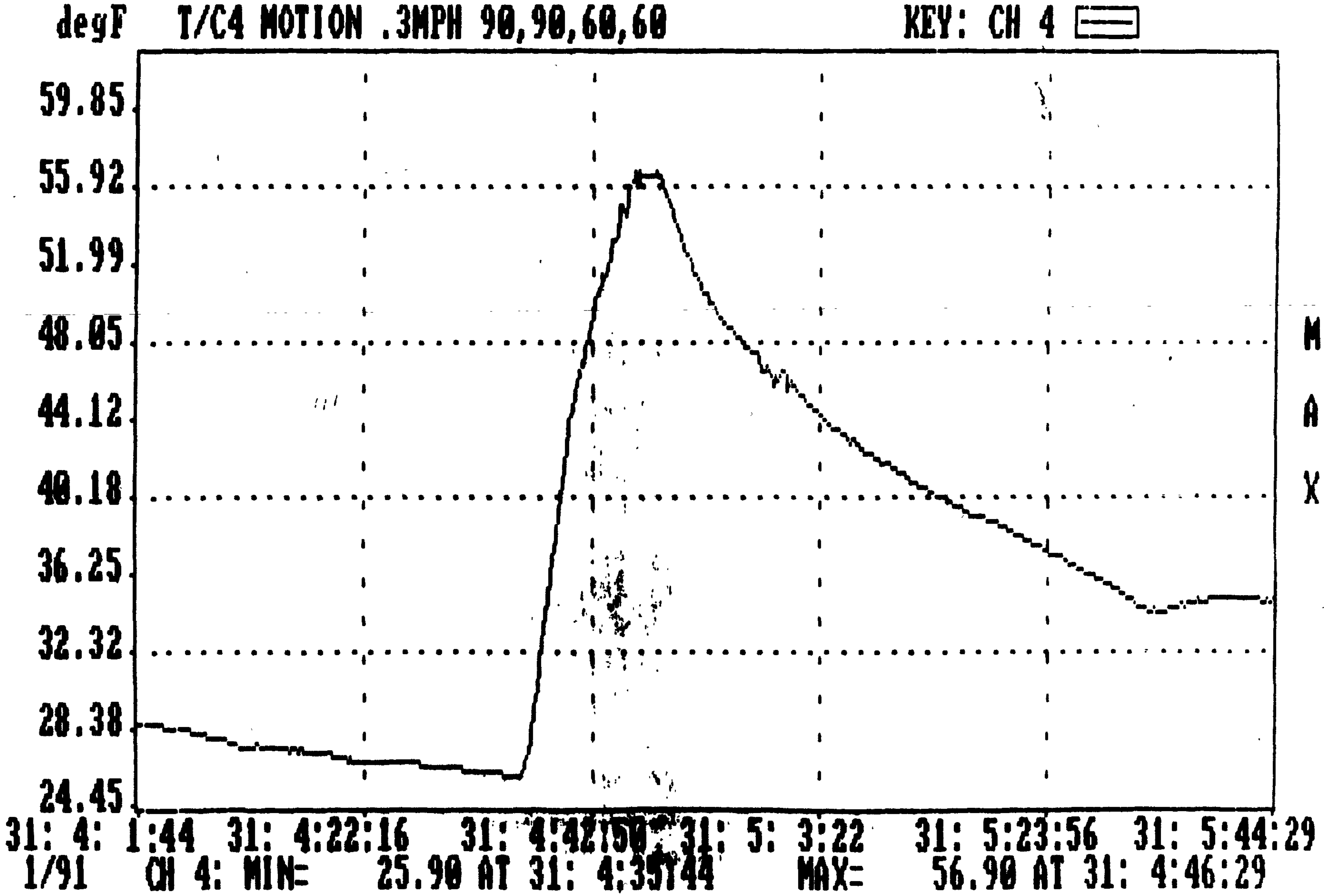

degF T/C4 MOTION .3MPH 90,90,60,60
KEY: CH 4
59.85
55.92
51.99
48.05
44.12
40.18
36.25
32.32
28.38
24.45
M
A
X
31: 4: 1:44
1/91
31: 4:22:16
31: 5: 3:22
31: 5:23:56
31: 5:44:29
CH 4: MIN= 25.90 AT 31: 4:35:44
MAX= 56.90 AT 31: 4:46:29

Figure 46.

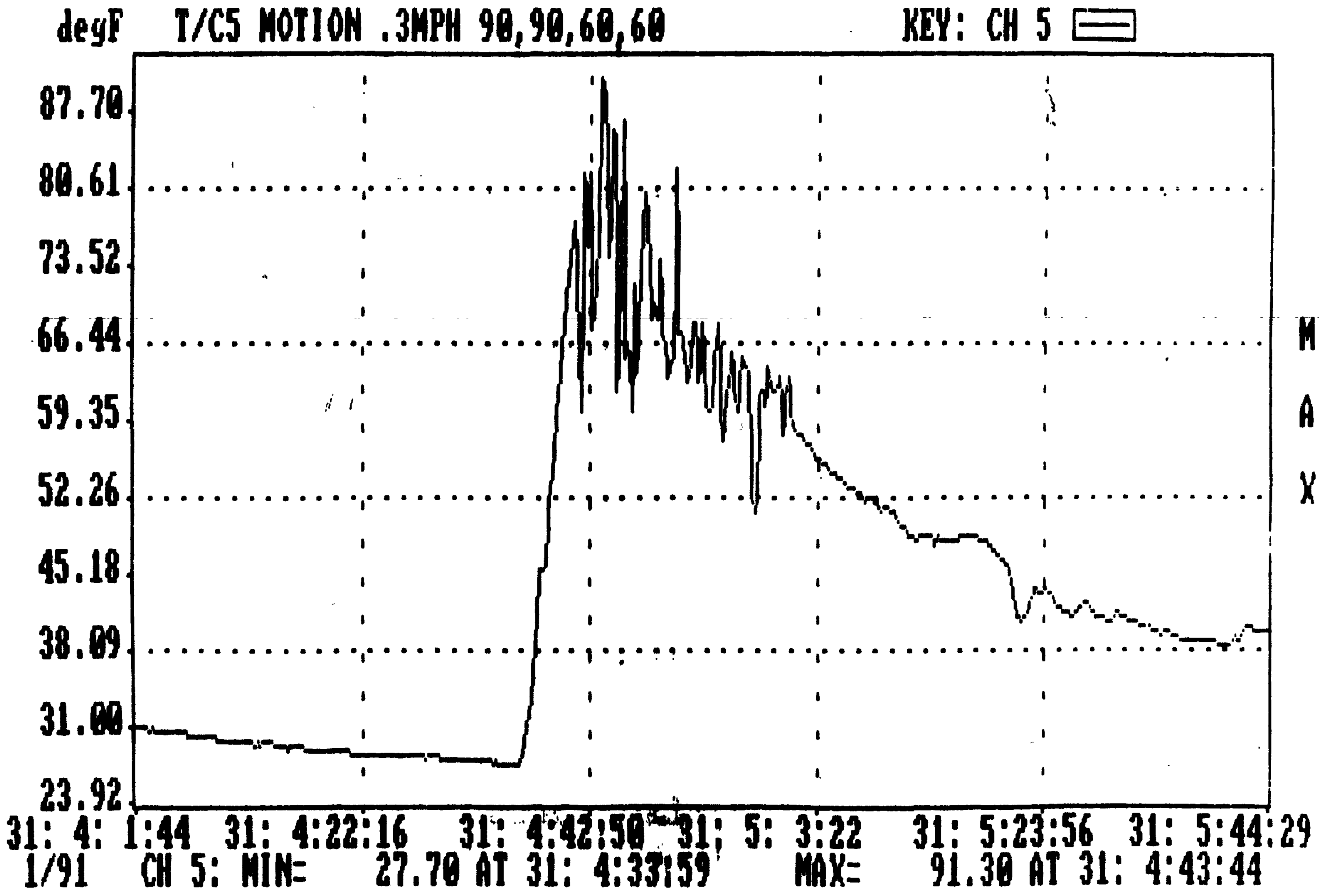

degF
T/C5 MOTION .3MPH 90,90,60,60
KEY: CH 5
87.70
80.61
73.52
66.44
59.35
52.26
45.18
38.09
31.00
23.92
31: 4: 1:44
31: 4:22:16
31: 4:42:50
31: 5: 3:22
31: 5:23:56
31: 5:44:29
1/91
CH 5: MIN= 27.70 AT 31: 4:33:59
MAX= 91.30 AT 31: 4:43:44
M
A
X

Figure 47.

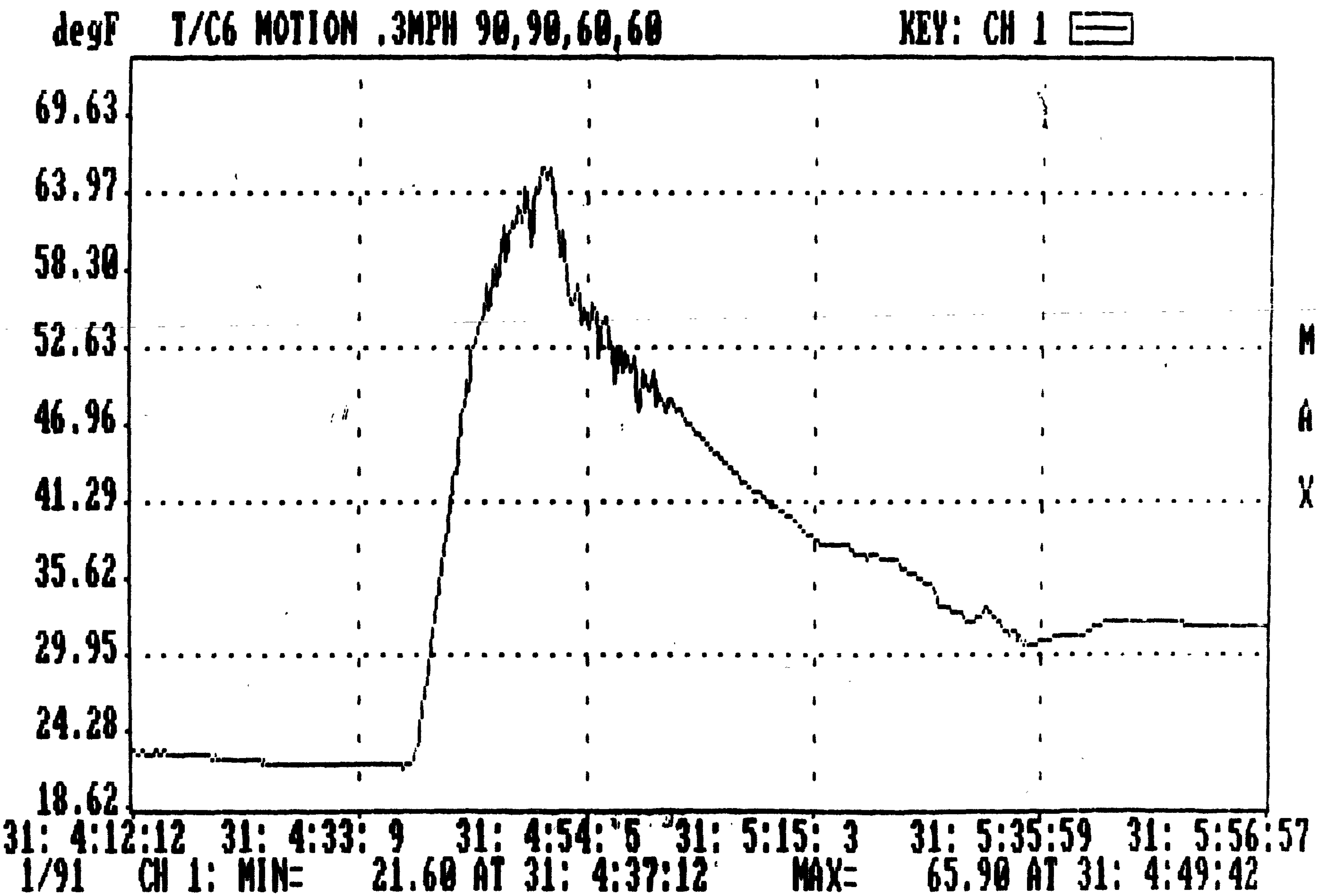

degF
T/C6 MOTION .3MPH 90,90,60,60
KEY: CH 1
69.63
63.97
58.30
52.63
46.96
41.29
35.62
29.95
24.28
18.62
M
A
X
31: 4:12:12
31: 4:33: 9
31: 4:54: 6
31: 5:15: 3
31: 5:35:59
31: 5:56:57
1/91
CH 1: MIN= 21.60 AT 31: 4:37:12
MAX= 65.90 AT 31: 4:49:42

Figure 48.

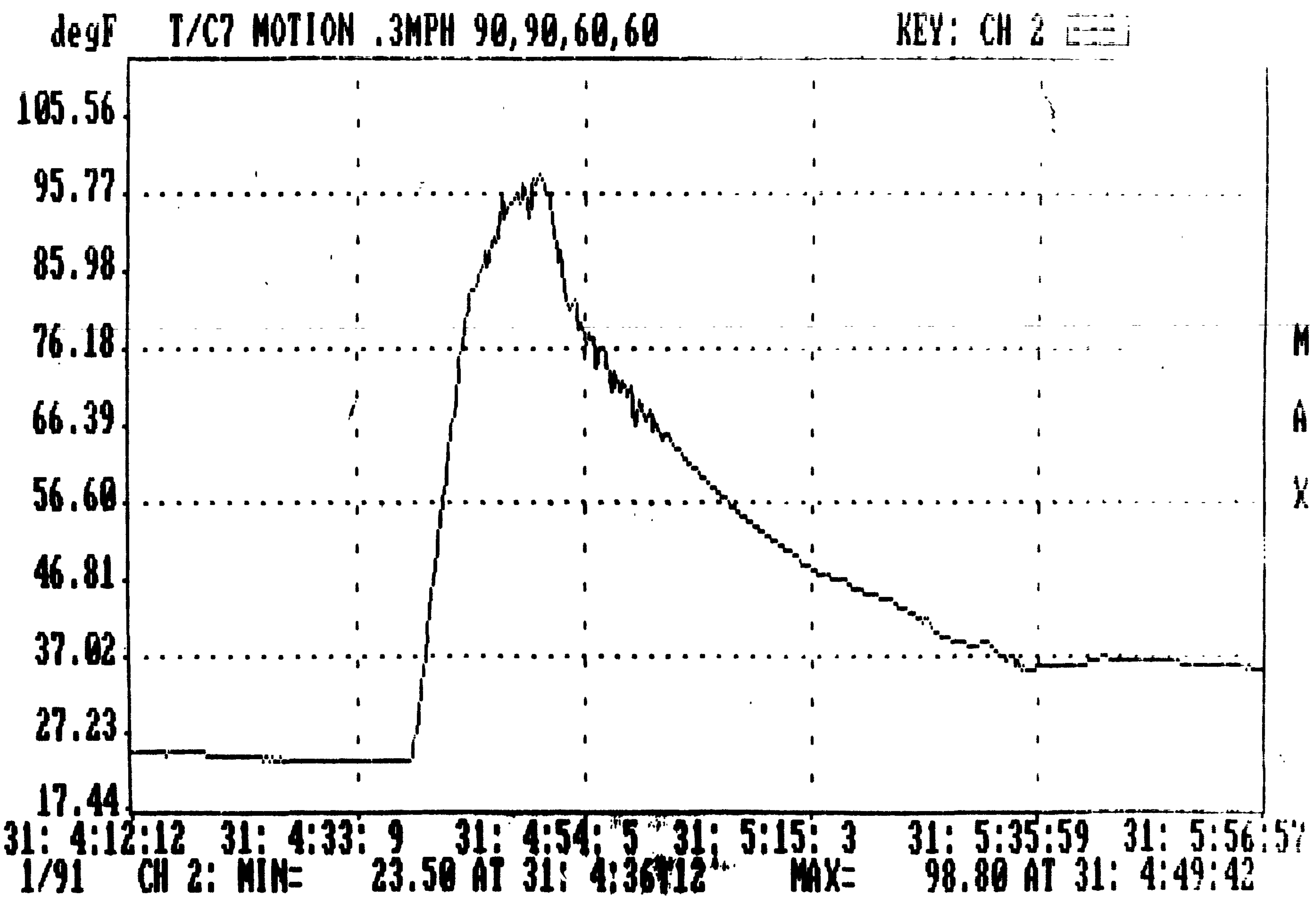

degF T/C7 MOTION .3MPH 90,90,60,60
KEY: CH 2
105.56
95.77
85.98
76.18
66.39
56.60
46.81
37.02
27.23
17.44
31: 4:12:12 31: 4:33: 9 31: 4:54: 5 31: 5:15: 3 31: 5:35:59 31: 5:56:57
1/91 CH 2: MIN= 23.50 AT 31: 4:36:12 MAX= 98.80 AT 31: 4:49:42
M
A
X

Figure 49.

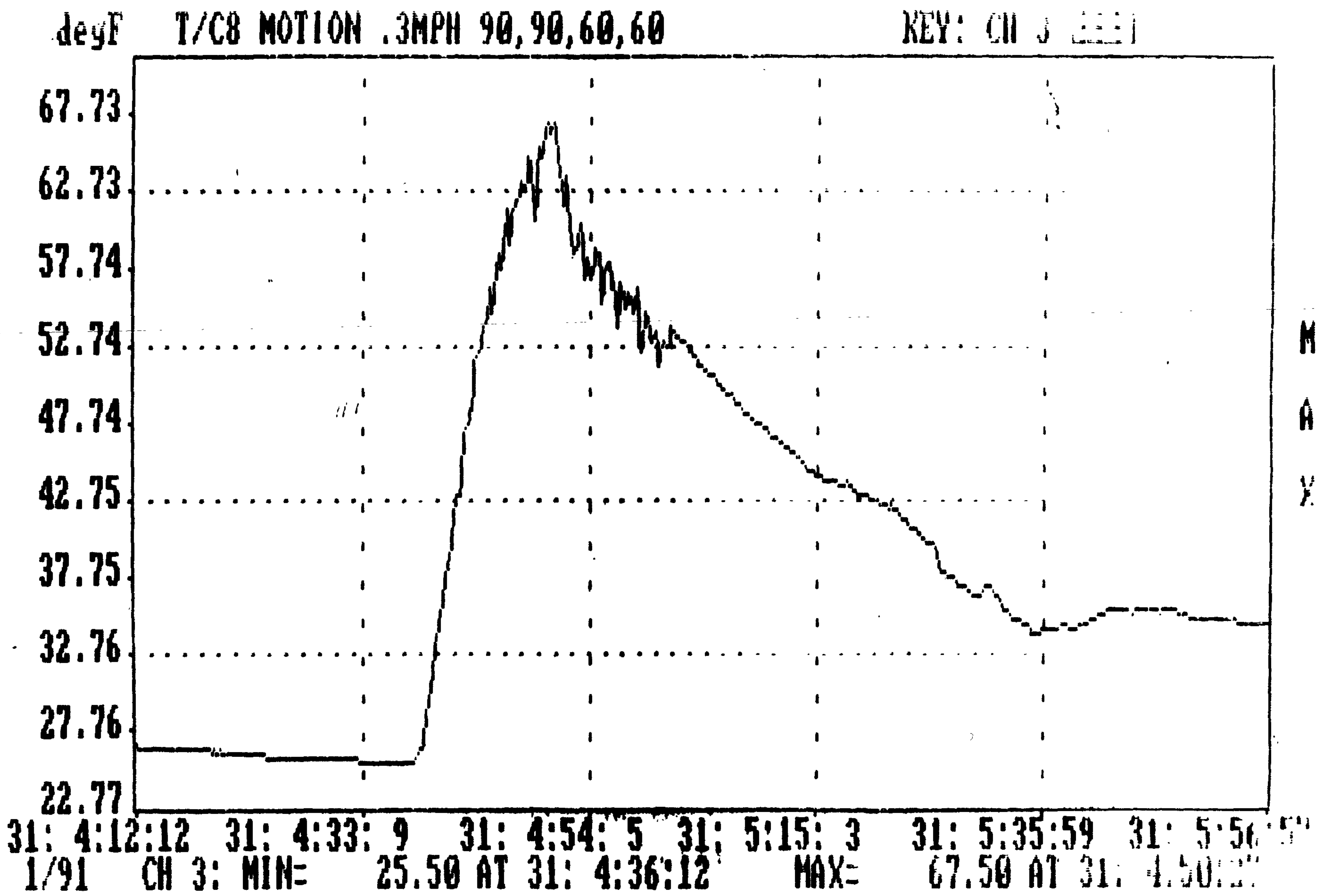

degF T/C8 MOTION .3MPH 90,90,60,60
KEY: CH 3
67.73
62.73
57.74
52.74
47.74
42.75
37.75
32.76
27.76
22.77
31: 4:12:12
1/91
31: 4:33: 9
31: 4:54: 5
31: 5:15: 3
31: 5:35:59
CH 3: MIN= 25.50 AT 31: 4:36:12
MAX= 67.50 AT 31:
M
A
X

Figure 50.

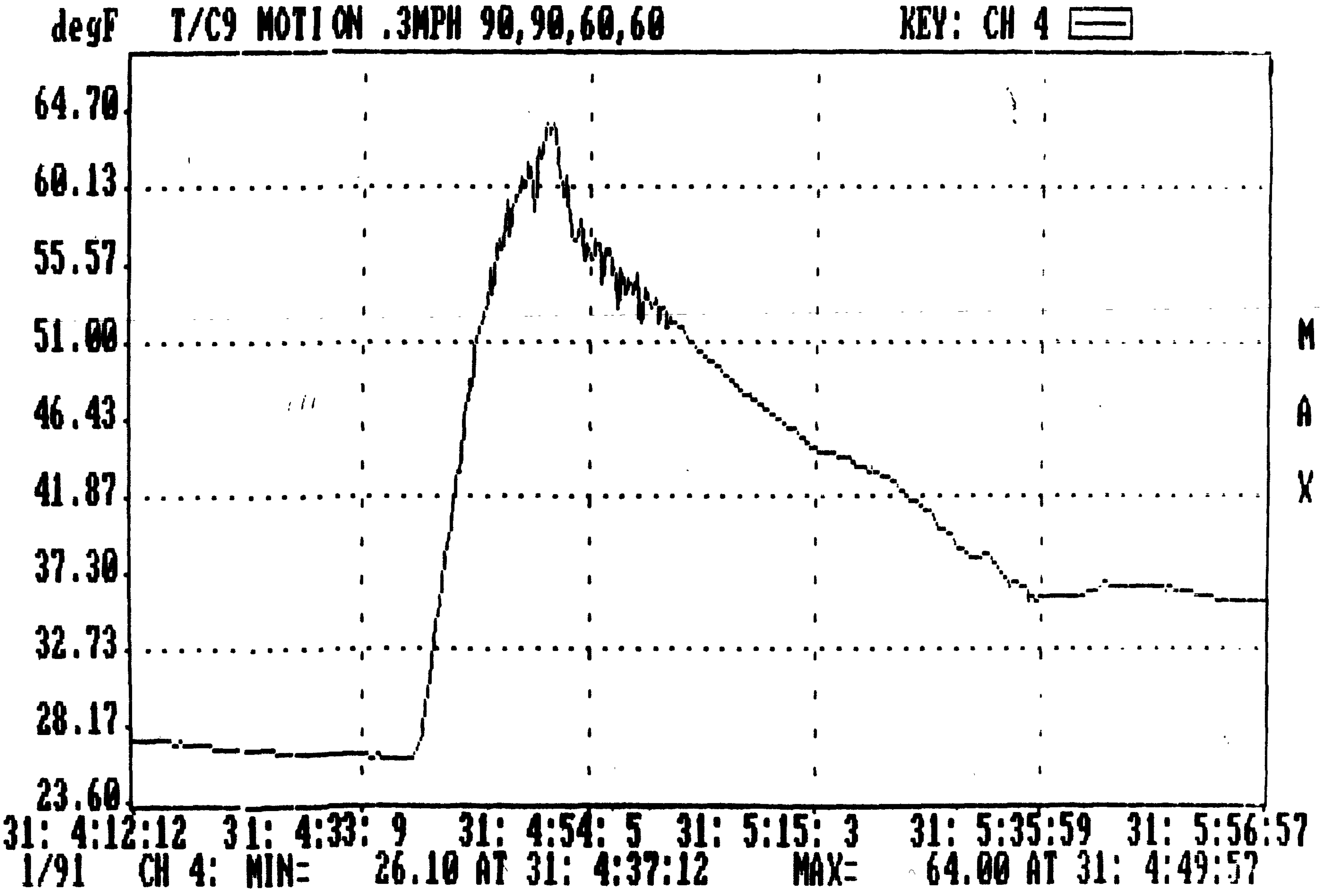

degF
T/C9 MOTI ON .3MPH 90,90,60,60
KEY: CH 4
64.70
60.13
55.57
51.00
46.43
41.87
37.30
32.73
28.17
23.60
M
A
X
31: 4:12:12
31: 4:33: 9
31: 4:54: 5
31: 5:15: 3
31: 5:35:59
31: 5:56:57
1/91
CH 4: MIN= 26.10 AT 31: 4:37:12 MAX= 64.00 AT 31: 4:49:57

Figure 51.

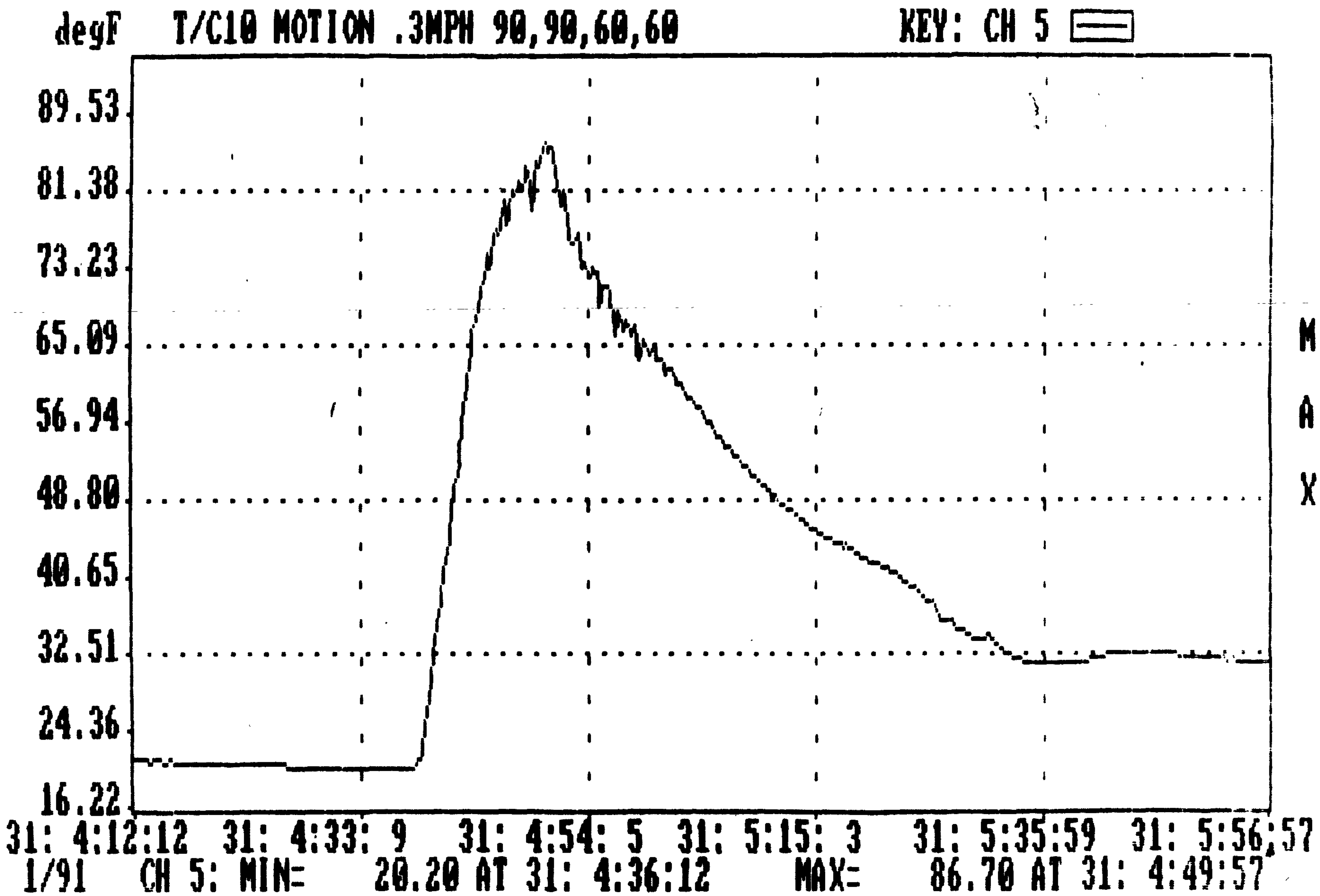

degF
T/C10 MOTION .3MPH 90,90,60,60
KEY: CH 5
89.53
81.38
73.23
65.09
56.94
48.80
40.65
32.51
24.36
16.22
M
A
X
31: 4:12:12
31: 4:33: 9
31: 4:54: 5
31: 5:15: 3
31: 5:35:59
31: 5:56:57
1/91
CH 5: MIN= 20.20 AT 31: 4:36:12
MAX= 86.70 AT 31: 4:49:57

Figure 52.

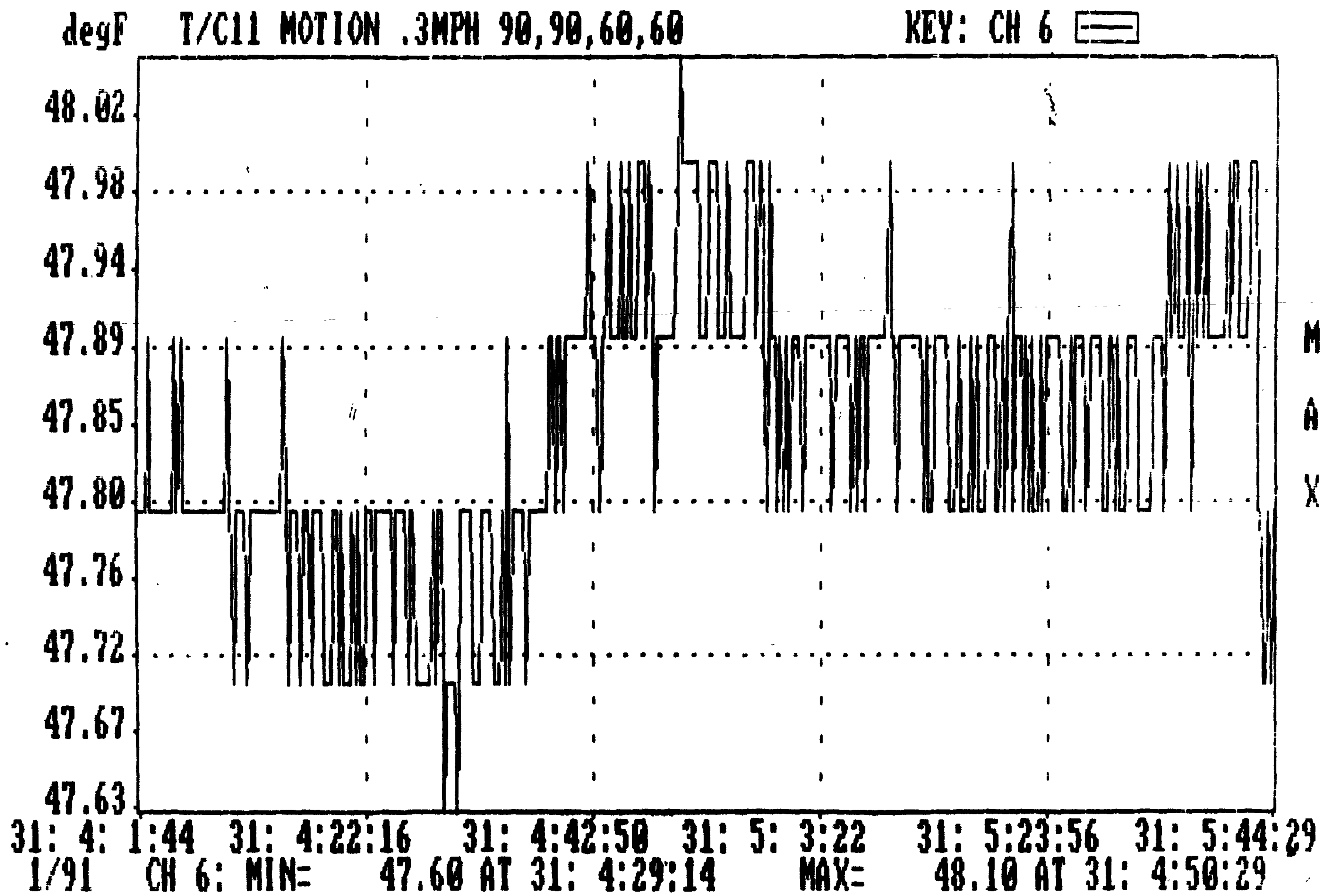

degF
T/C11 MOTION .3MPH 90,90,60,60
KEY: CH 6
48.02
47.98
47.94
47.89
47.85
47.80
47.76
47.72
47.67
47.63
M
A
X
31: 4: 1:44 31: 4:22:16 31: 4:42:50 31: 5: 3:22 31: 5:23:56 31: 5:44:29
1/91 CH 6: MIN= 47.60 AT 31: 4:29:14 MAX= 48.10 AT 31: 4:50:29

Figure 53.

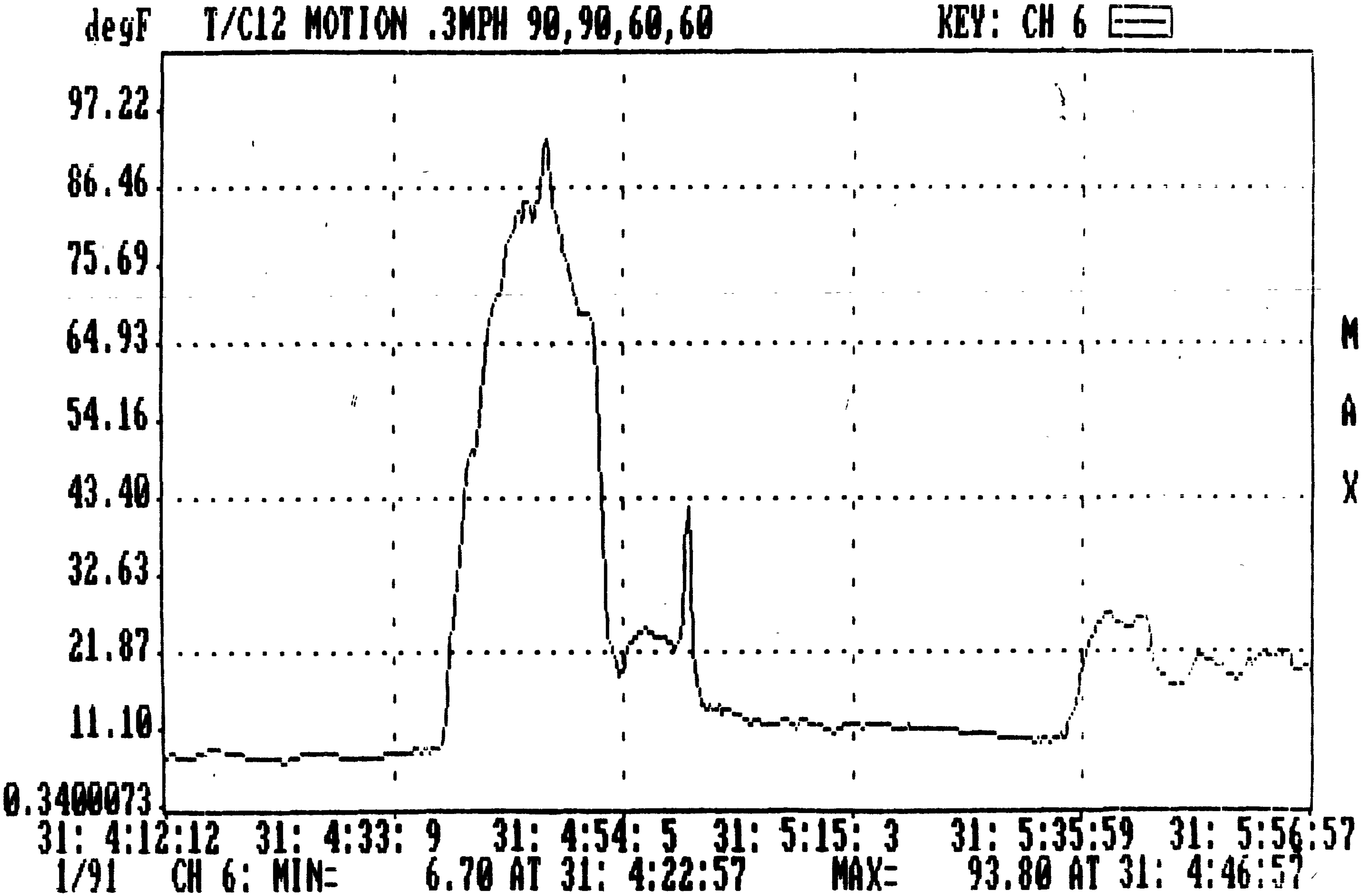

degF
T/C12 MOTION .3MPH 90,90,60,60
KEY: CH 6
97.22
86.46
75.69
64.93
54.16
43.40
32.63
21.87
11.10
0.3400073
MAX
31: 4:12:12
31: 4:33: 9
31: 4:54: 5
31: 5:15: 3
31: 5:35:59
31: 5:56:57
1/91
CH 6: MIN= 6.70 AT 31: 4:22:57
MAX= 93.80 AT 31: 4:46:57

Figure 54.

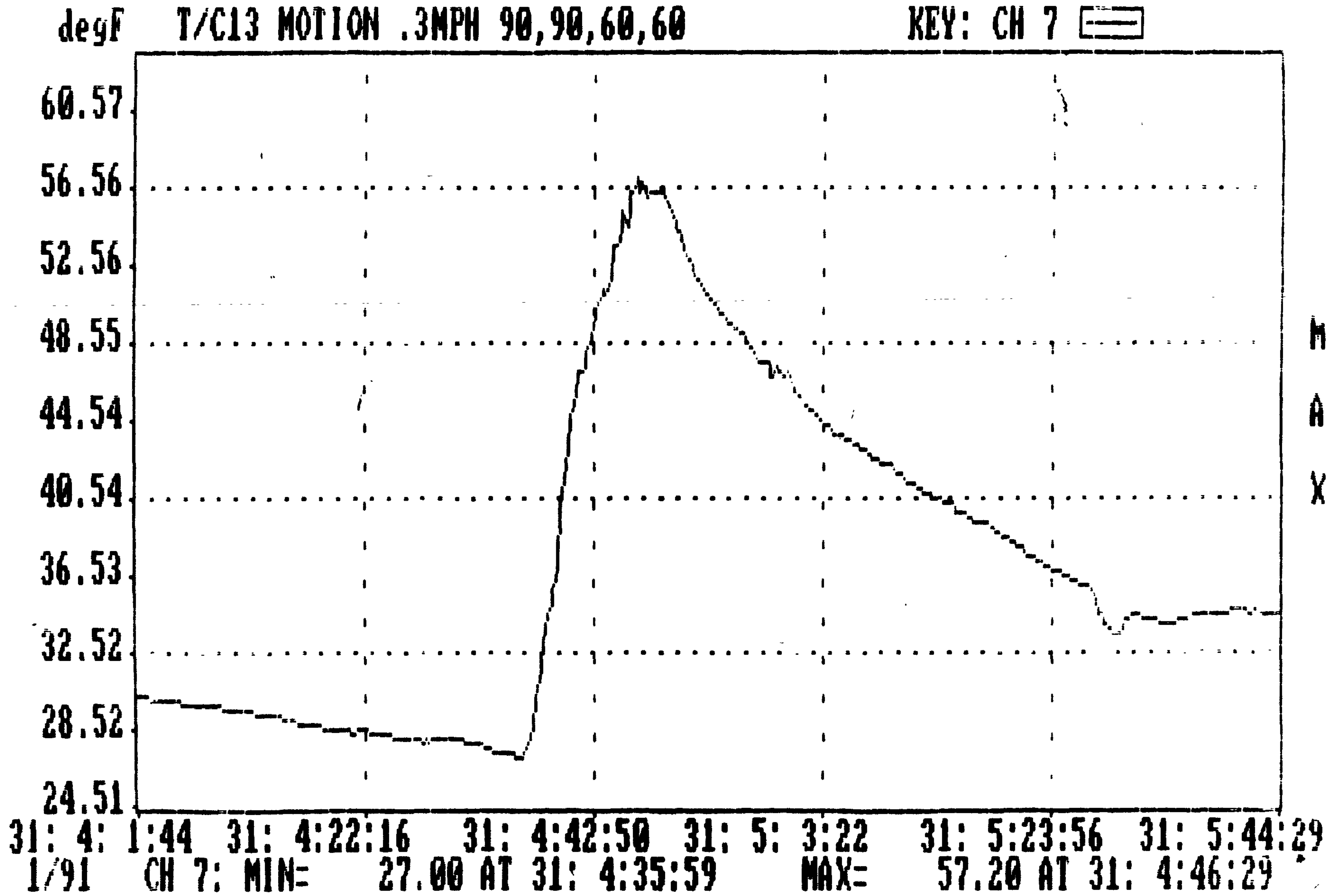

degF
T/C13 MOTION .3MPH 90,90,60,60
KEY: CH 7
60.57
56.56
52.56
48.55
44.54
40.54
36.53
32.52
28.52
24.51
M
A
X
31: 4: 1:44
31: 4:22:16
31: 4:42:50
31: 5: 3:22
31: 5:23:56
31: 5:44:29
1/91
CH 7: MIN= 27.00 AT 31: 4:35:59
MAX= 57.20 AT 31: 4:46:29

Figure 55.

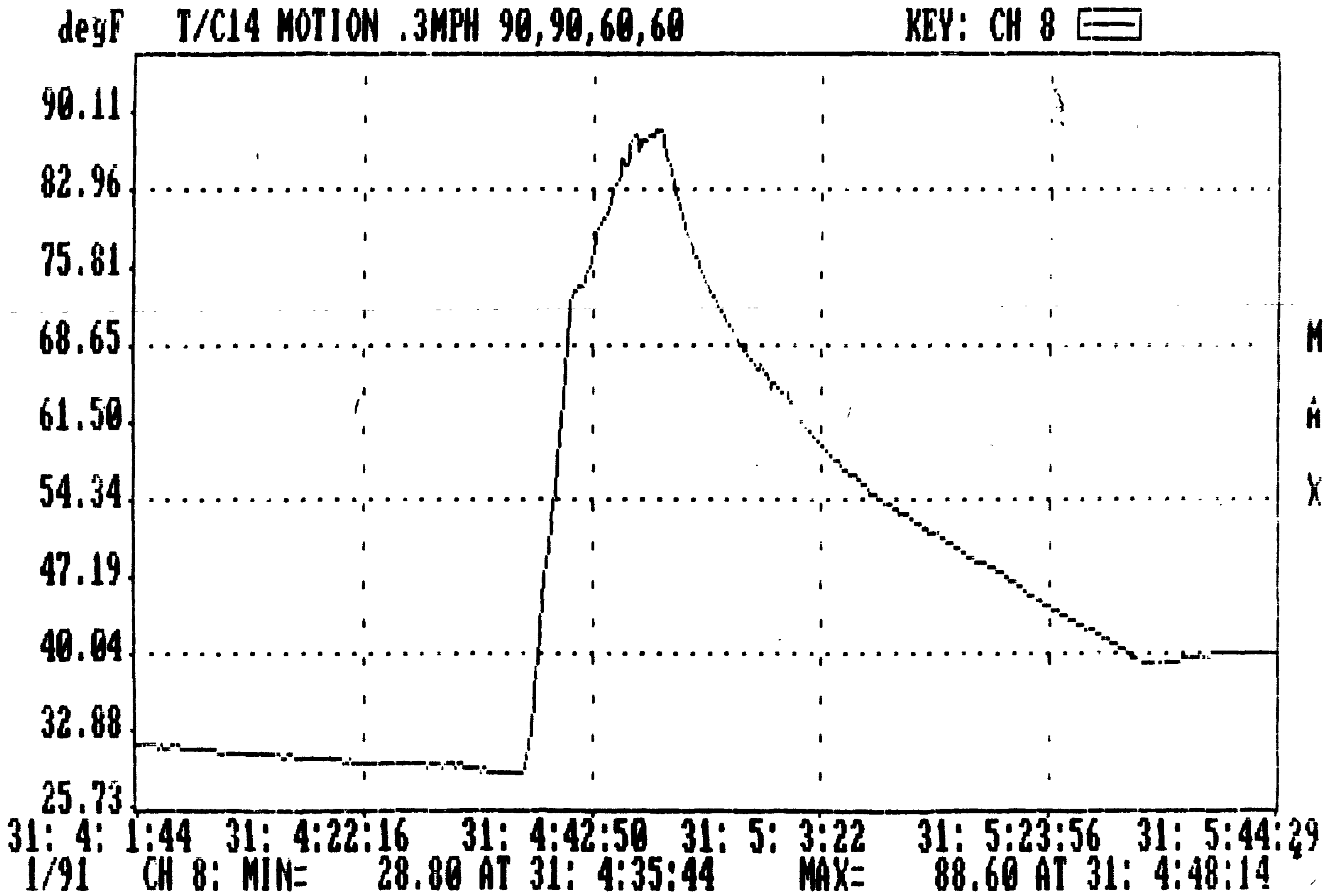

degF
T/C14 MOTION .3MPH 90,90,60,60
KEY: CH 8
90.11
82.96
75.81
68.65
61.50
54.34
47.19
40.04
32.88
25.73
31: 4: 1:44
31: 4:22:16
31: 4:42:50
31: 5: 3:22
31: 5:23:56
31: 5:44:29
1/91
CH 8: MIN= 28.80 AT 31: 4:35:44
MAX= 88.60 AT 31: 4:48:14
M
A
X

Figure 56.

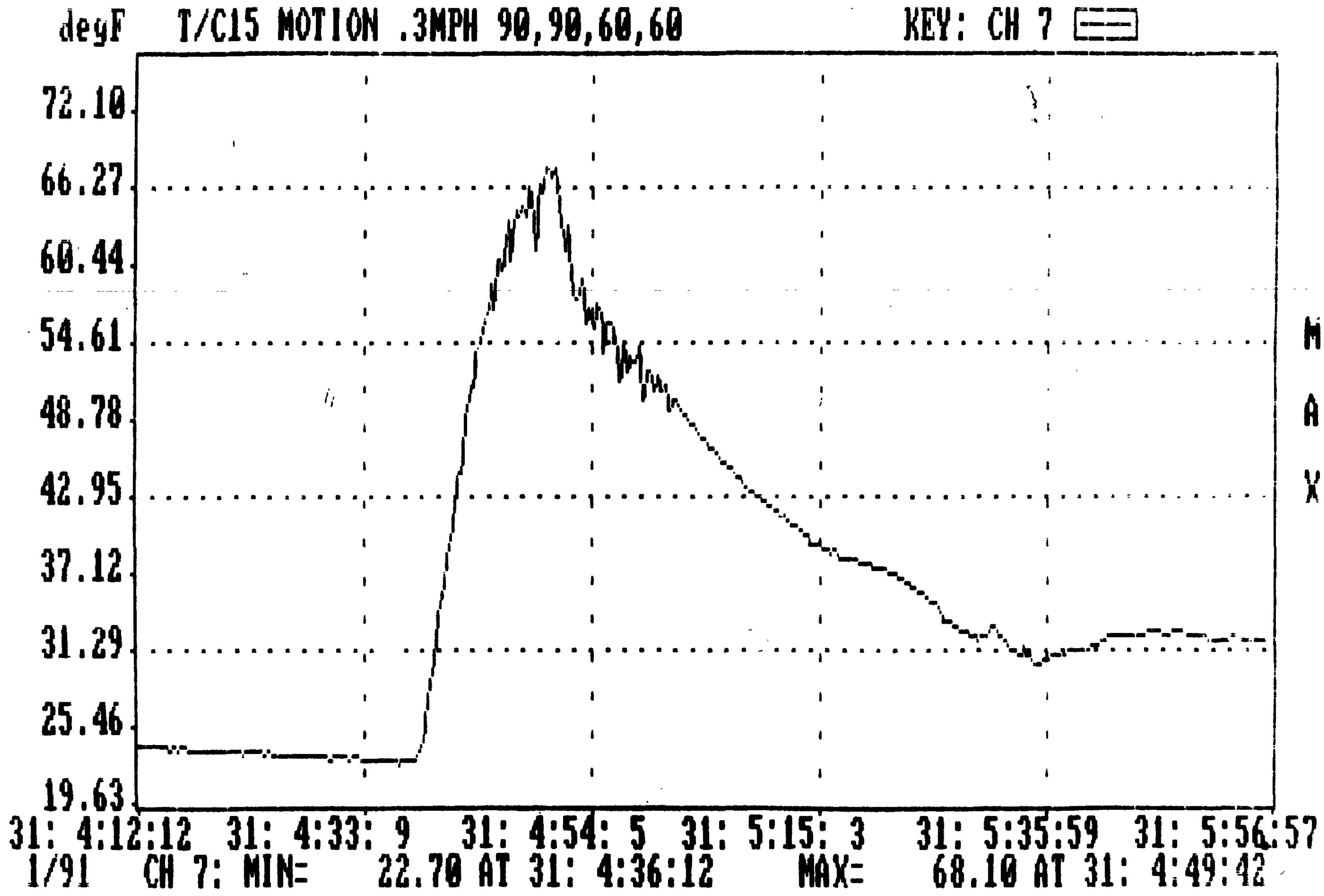

degF
T/C15 MOTION .3MPH 90,90,60,60
KEY: CH 7
72.10
66.27
60.44
54.61
48.78
42.95
37.12
31.29
25.46
19.63
M
A
X
31: 4:12:12
31: 4:33: 9
31: 4:54: 5
31: 5:15: 3
31: 5:35:59
31: 5:56:57
1/91
CH 7: MIN= 22.70 AT 31: 4:36:12 MAX= 68.10 AT 31: 4:49:42

Figure 57.

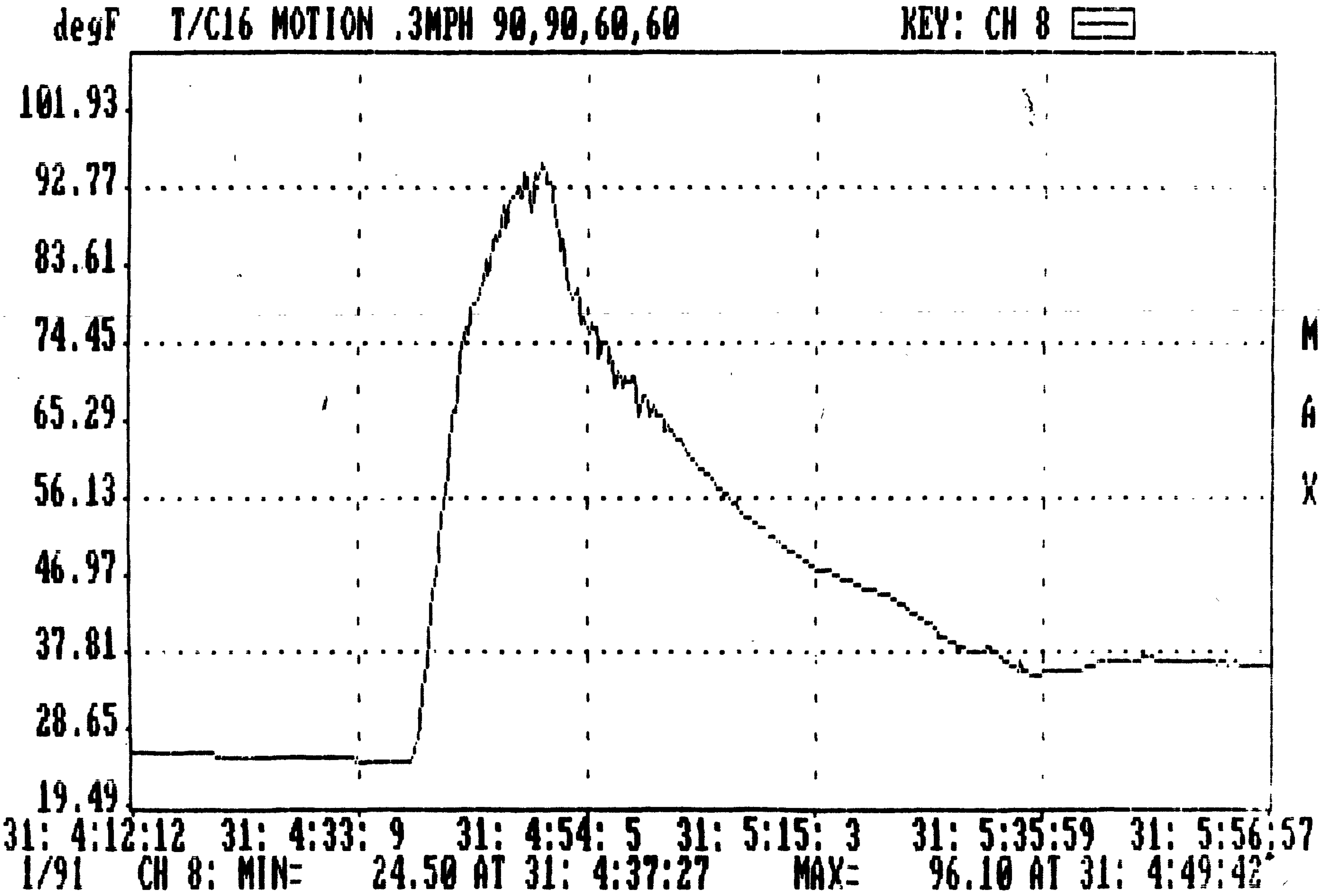

degF
T/C16 MOTION .3MPH 90,90,60,60
KEY: CH 8
101.93
92.77
83.61
74.45
65.29
56.13
46.97
37.81
28.65
19.49
31: 4:12:12
31: 4:33: 9
31: 4:54: 5
31: 5:15: 3
31: 5:35:59
31: 5:56:57
1/91
CH 8: MIN= 24.50 AT 31: 4:37:27
MAX= 96.10 AT 31: 4:49:42
M
A
X

Figure 58.

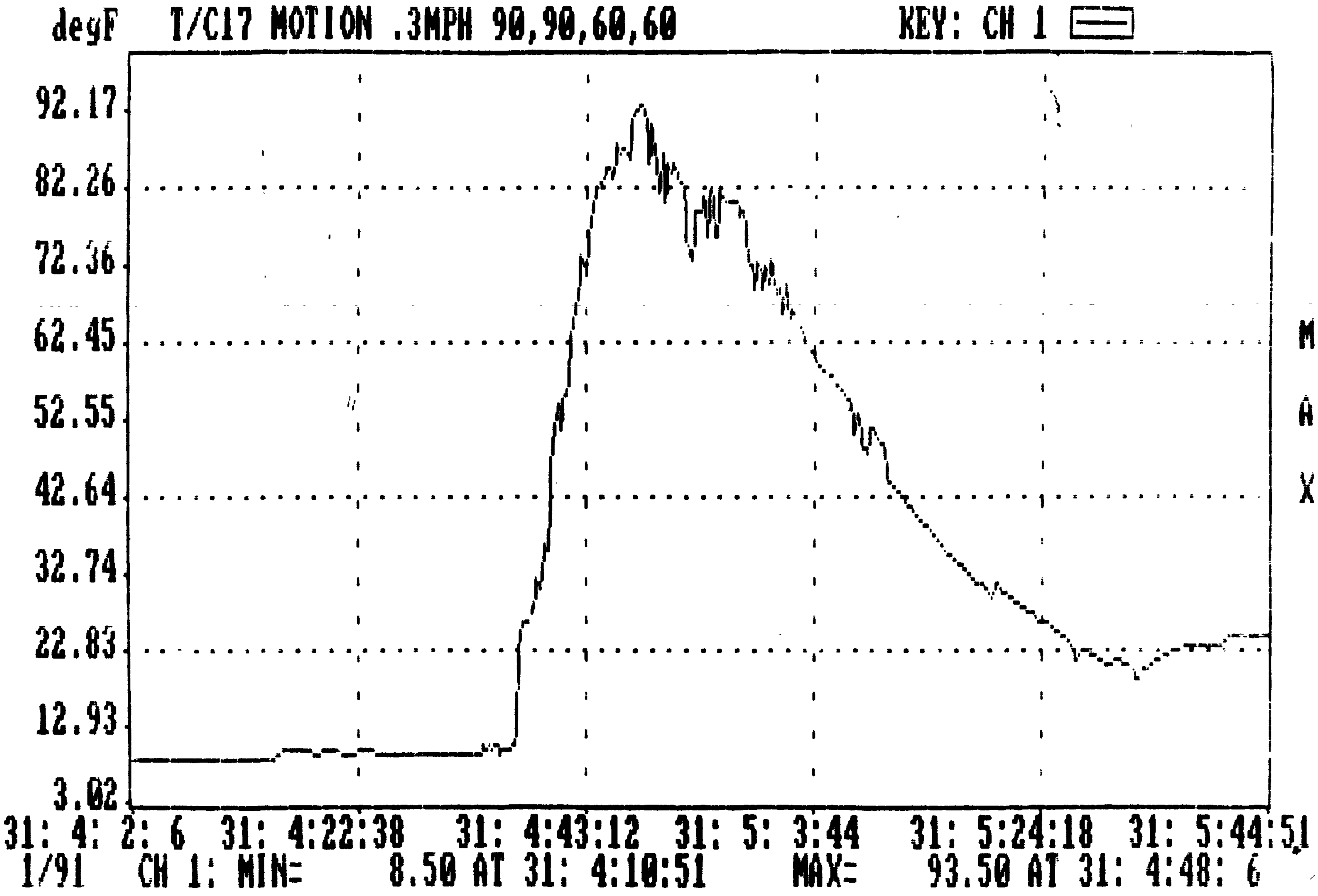

degF
T/C17 MOTION .3MPH 90,90,60,60
KEY: CH 1
92.17
82.26
72.36
62.45
52.55
42.64
32.74
22.83
12.93
3.02
MAX
31: 4: 2: 6
1/91
31: 4:22:38
31: 4:43:12
31: 5: 3:44
31: 5:24:18
31: 5:44:51
CH 1: MIN= 8.50 AT 31: 4:10:51 MAX= 93.50 AT 31: 4:48: 6

Figure 59.

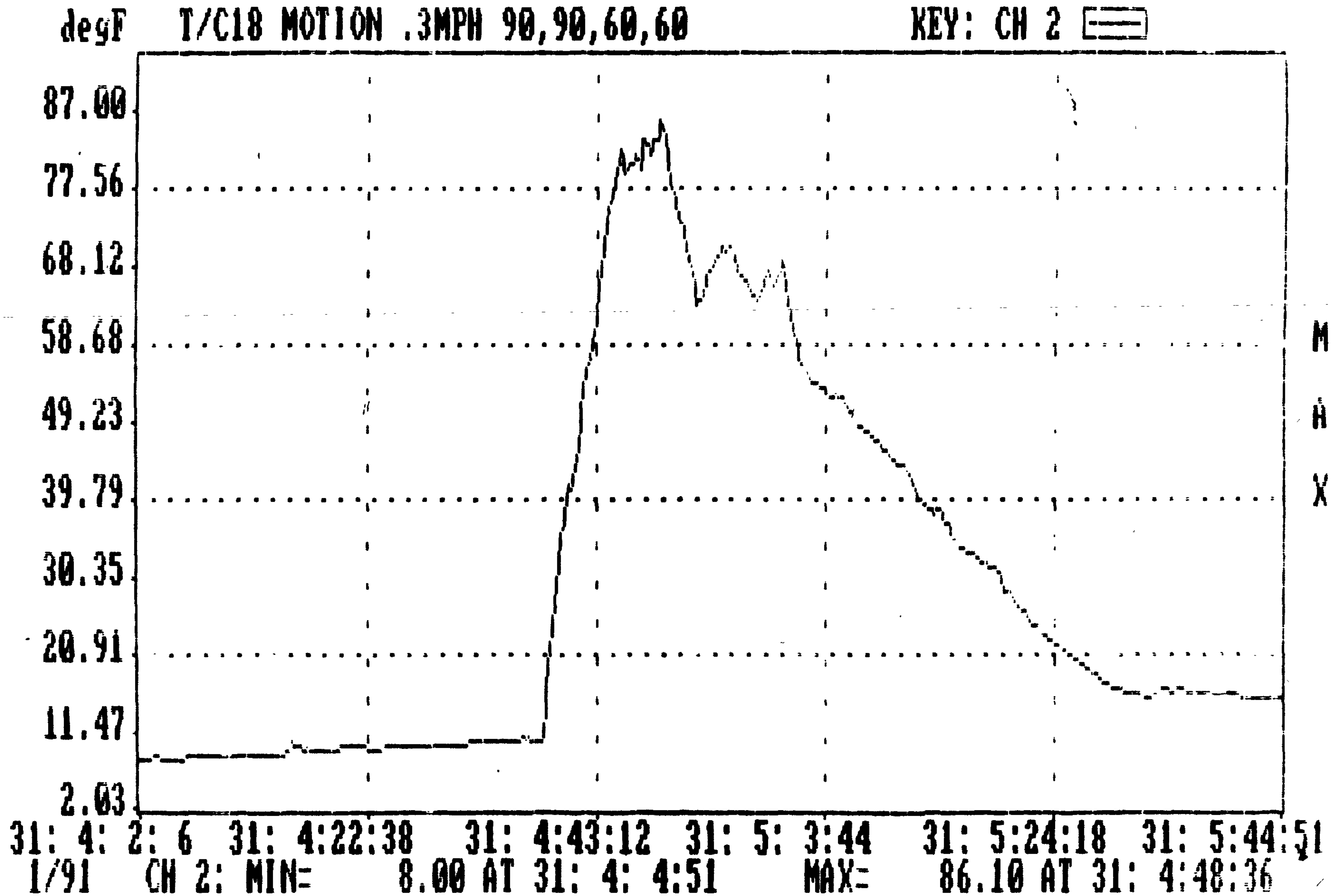

degF
T/C18 MOTION .3MPH 90,90,60,60
KEY: CH 2
87.00
77.56
68.12
58.68
49.23
39.79
30.35
20.91
11.47
2.03
31: 4: 2: 6
31: 4:22:38
31: 4:43:12
31: 5: 3:44
31: 5:24:18
31: 5:44:51
1/91
CH 2: MIN= 8.00 AT 31: 4: 4:51
MAX= 86.10 AT 31: 4:48:36
MAX

Figure 60.

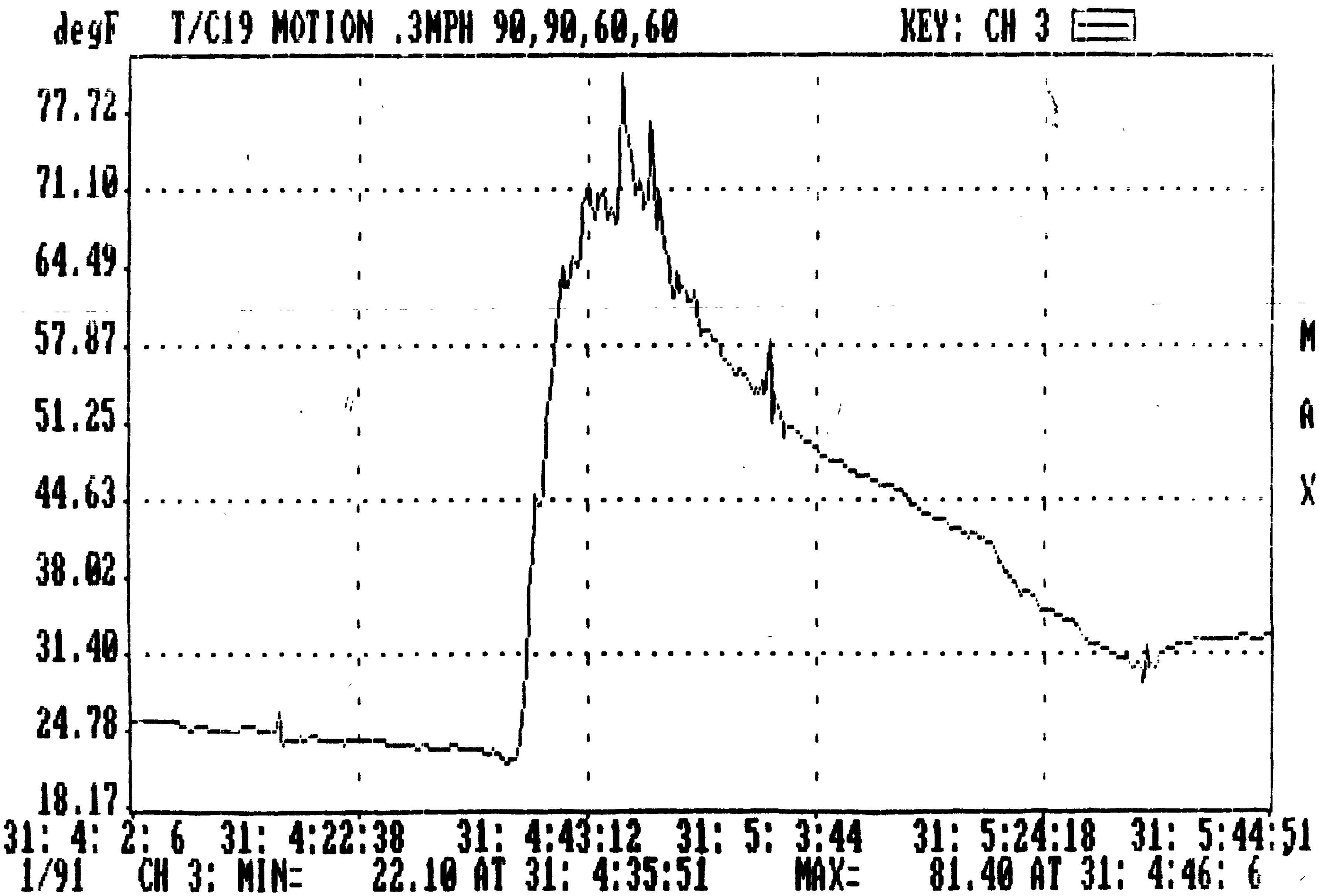

degF T/C19 MOTION .3MPH 90,90,60,60
KEY: CH 3
77.72
71.10
64.49
57.87
51.25
44.63
38.02
31.40
24.78
18.17
31: 4: 2: 6
31: 4:22:38
31: 4:43:12
31: 5: 3:44
31: 5:24:18
31: 5:44:51
1/91 CH 3: MIN= 22.10 AT 31: 4:35:51 MAX= 81.40 AT 31: 4:46: 6
M
A
X

Figure 61.

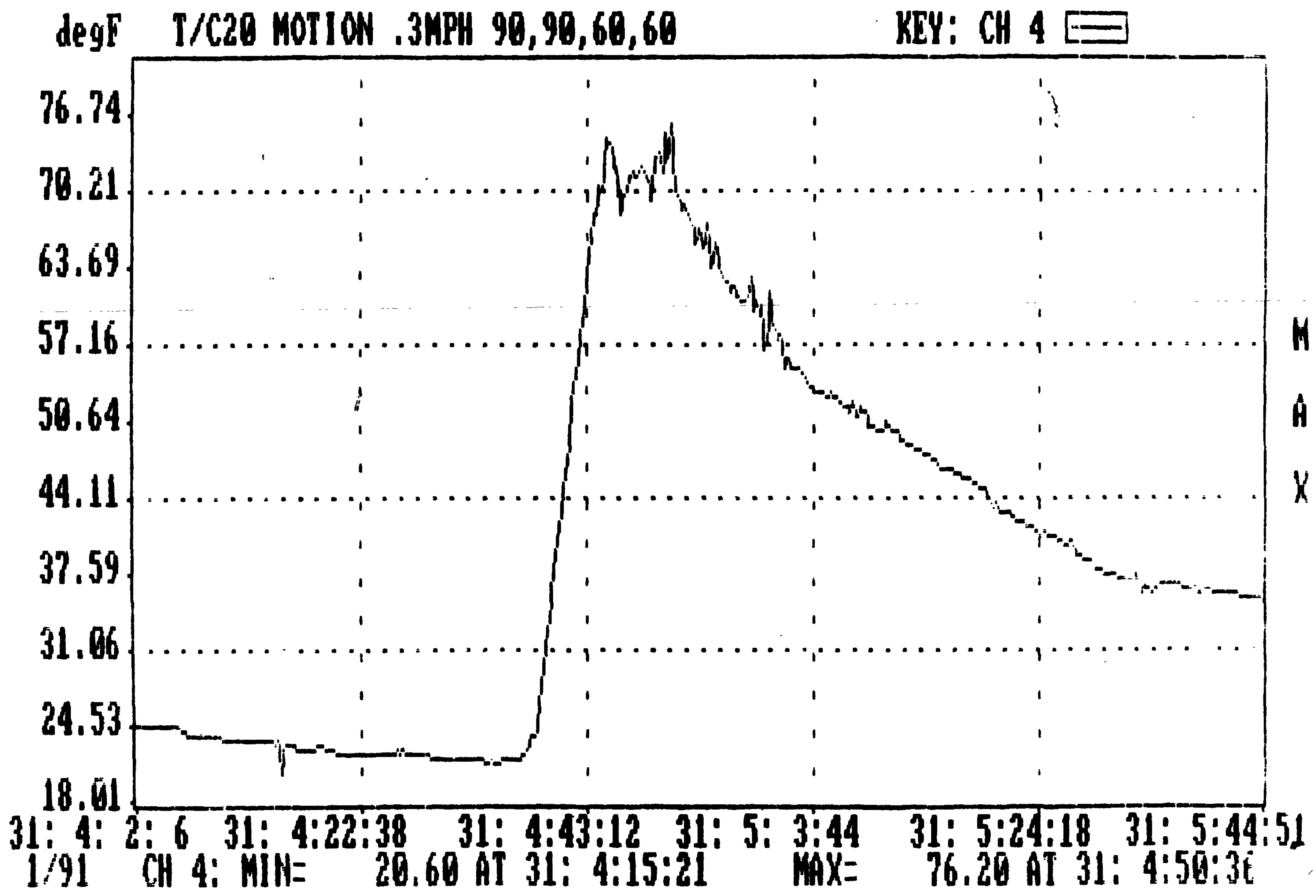

degF
T/C20 MOTION .3MPH 90,90,60,60
KEY: CH 4
76.74
70.21
63.69
57.16
50.64
44.11
37.59
31.06
24.53
18.01
MAX
31: 4: 2: 6
31: 4:22:38
31: 4:43:12
31: 5: 3:44
31: 5:24:18
31: 5:44:51
1/91 CH 4: MIN= 20.60 AT 31: 4:15:21 MAX= 76.20 AT 31: 4:50:36

Figure 62.

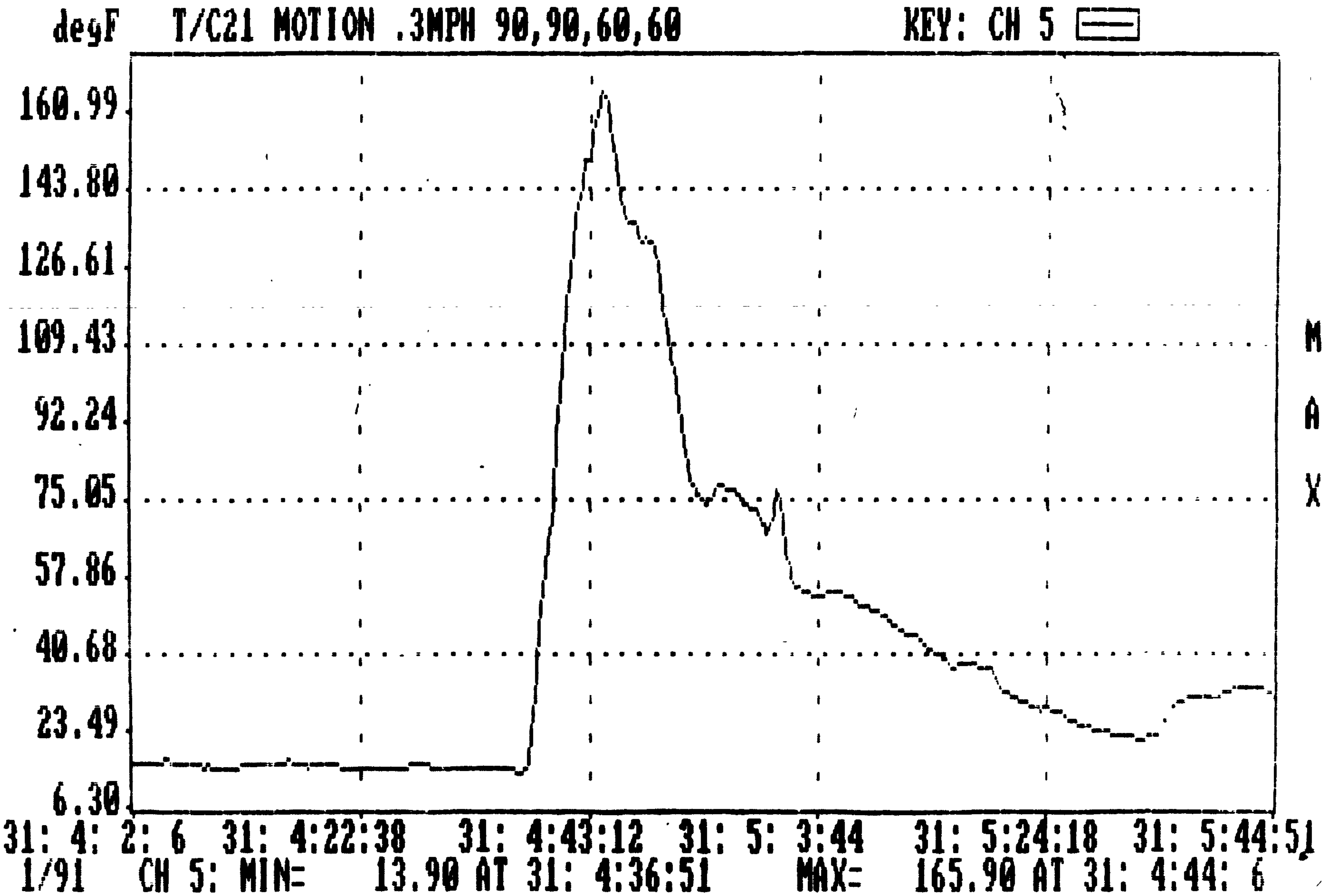


Figure 63.

IP12_002243

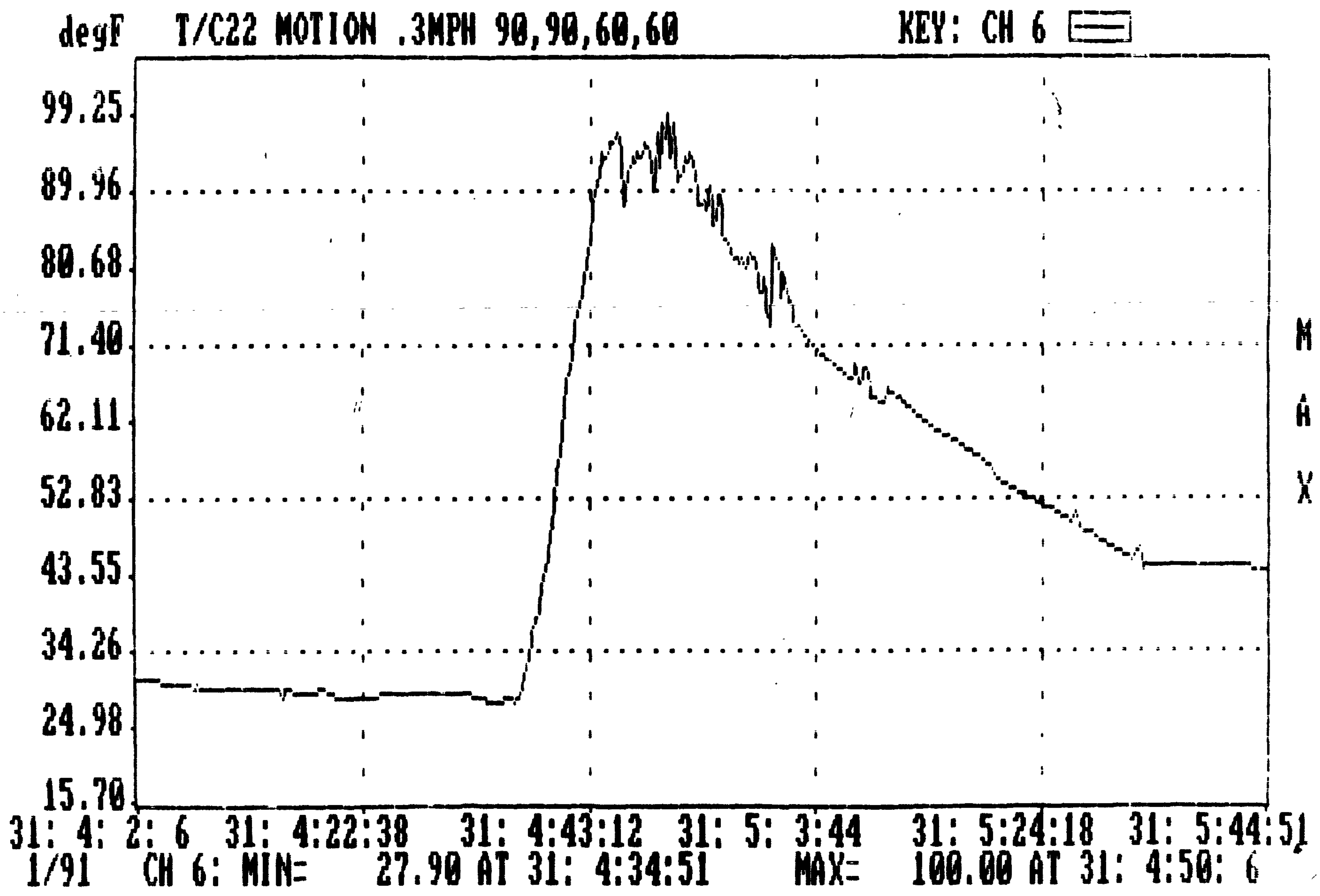


Figure 64.

IP12_002244

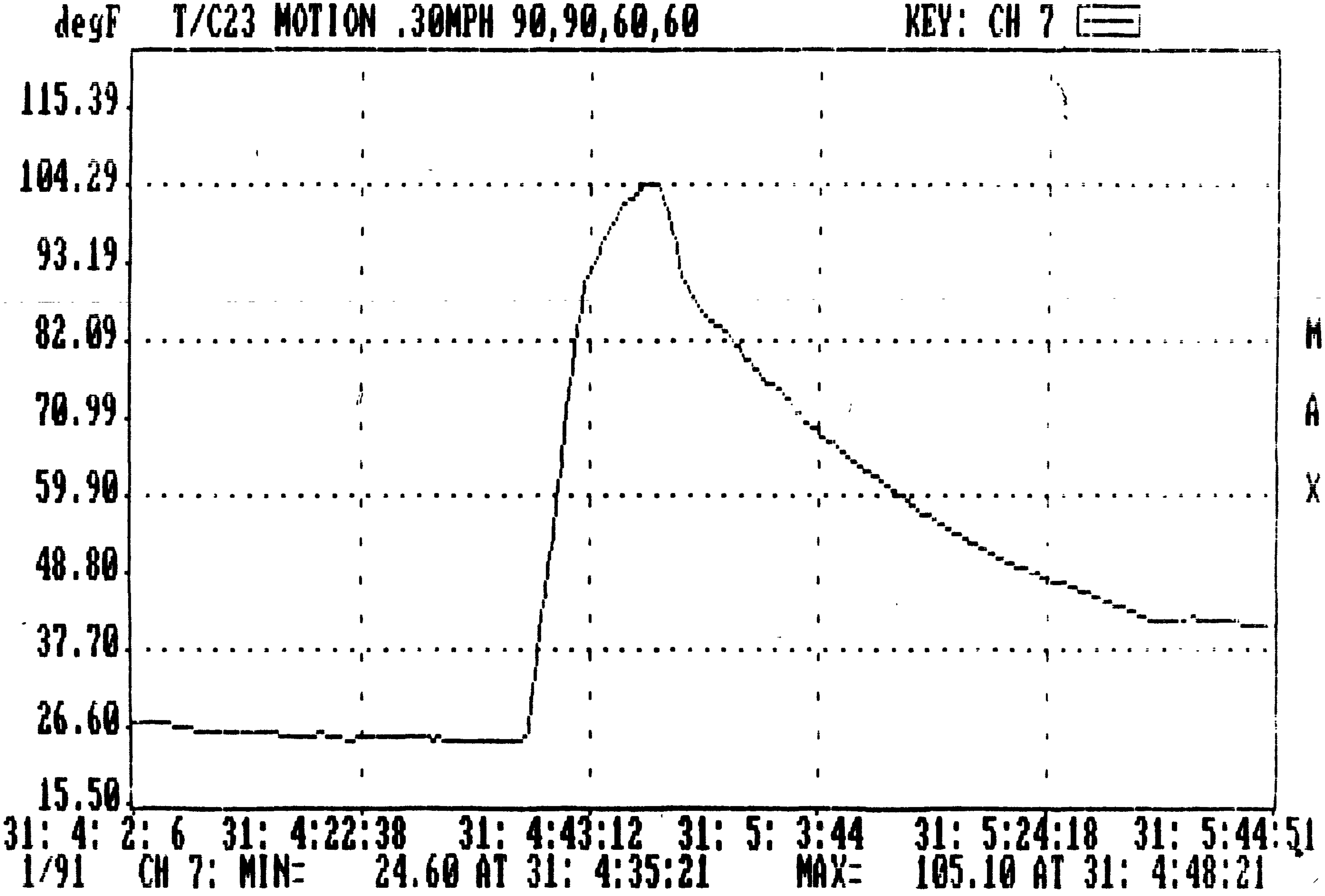

degF
T/C23 MOTION .30MPH 90,90,60,60
KEY: CH 7
115.39
104.29
93.19
82.09
70.99
59.90
48.80
37.70
26.60
15.50
MAX
31: 4: 2: 6
31: 4:22:38
31: 4:43:12
31: 5: 3:44
31: 5:24:18
31: 5:44:51
1/91 CH 7: MIN= 24.60 AT 31: 4:35:21 MAX= 105.10 AT 31: 4:48:21

Figure 65.

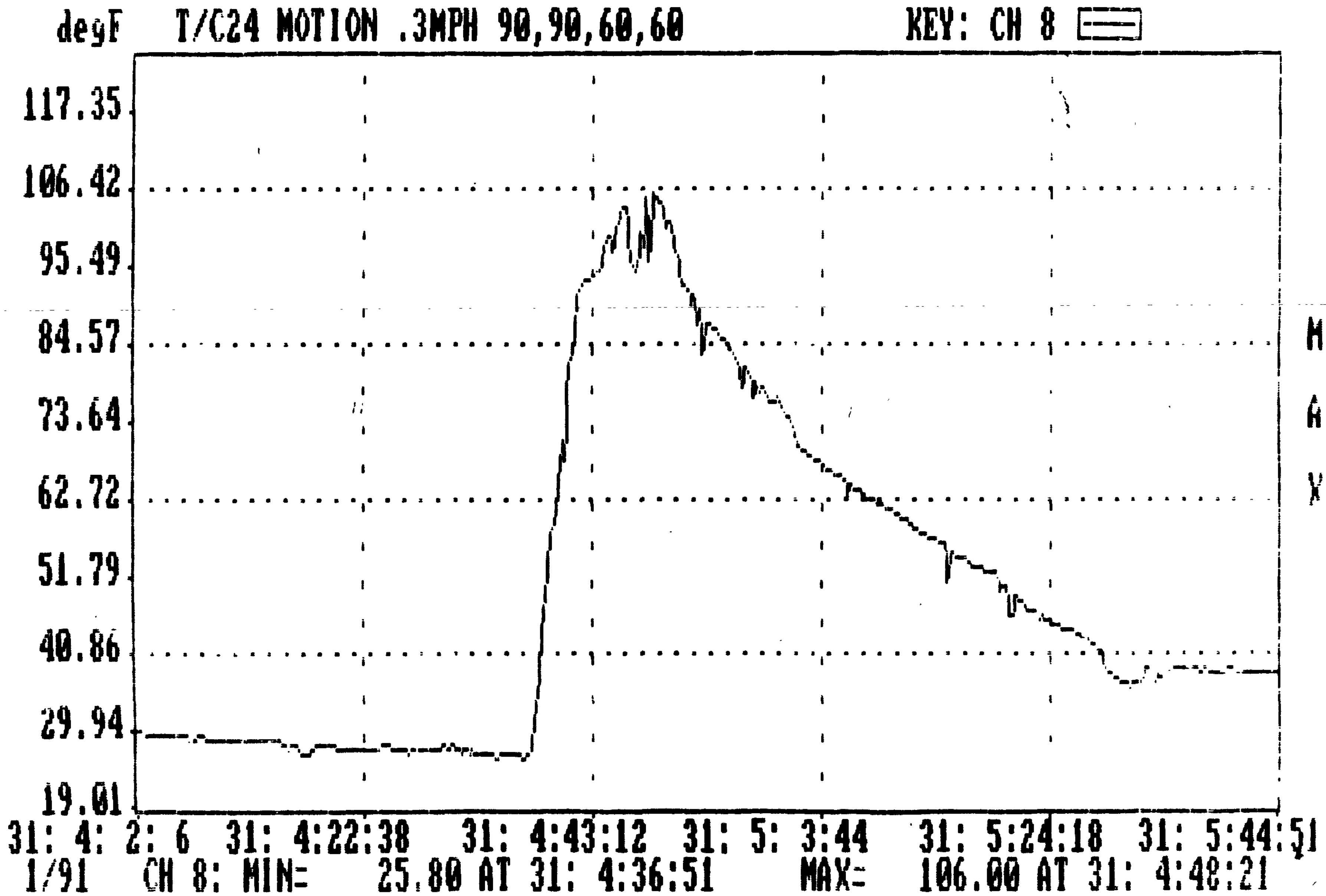

degF
T/C24 MOTION .3MPH 90,90,60,60
KEY: CH 8
117.35
106.42
95.49
84.57
73.64
62.72
51.79
40.86
29.94
19.01
31: 4: 2: 6
31: 4:22:38
31: 4:43:12
31: 5: 3:44
31: 5:24:18
31: 5:44:51
1/91
CH 8: MIN= 25.80 AT 31: 4:36:51
MAX= 106.00 AT 31: 4:48:21
M
A
X

Figure 66.

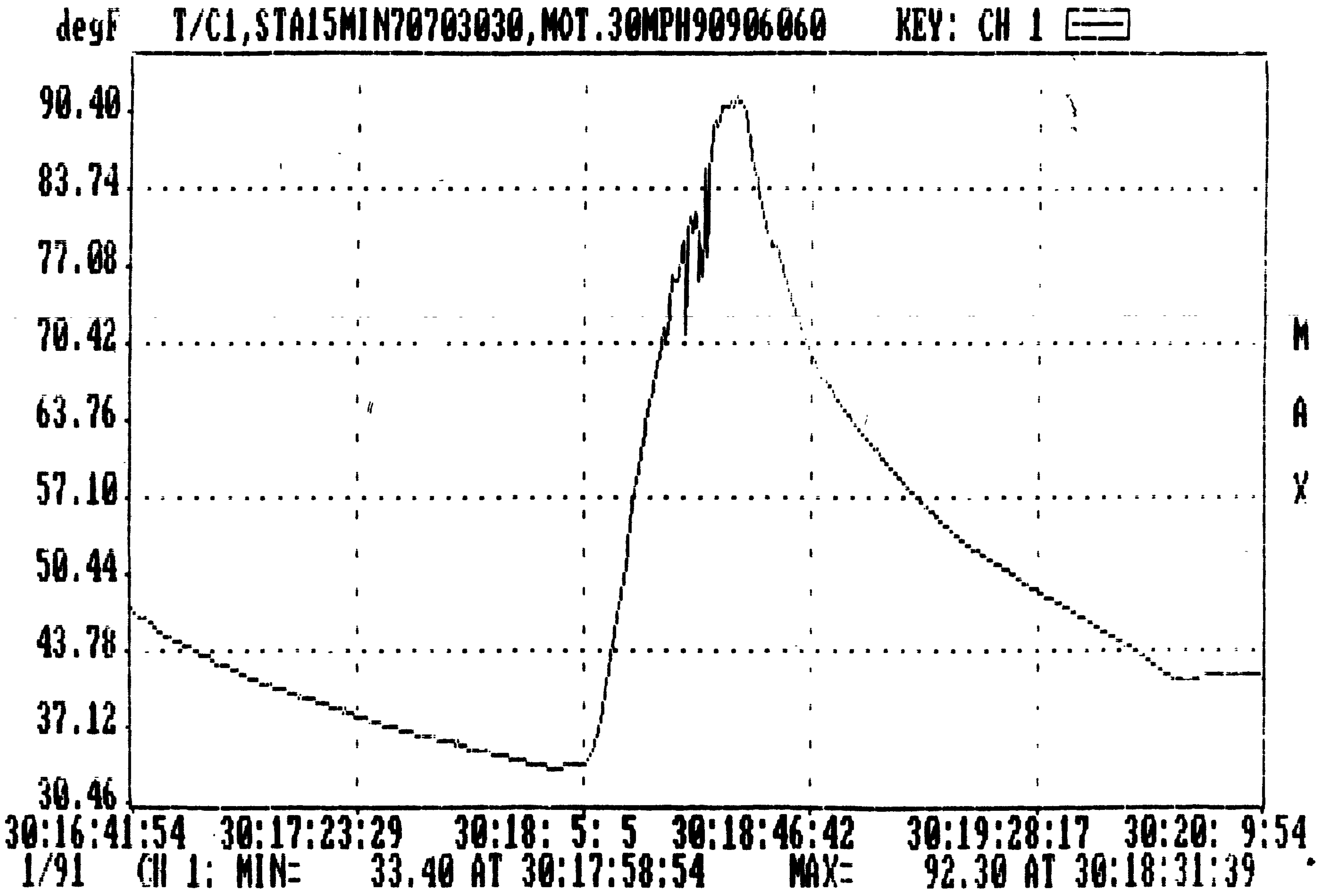

degF
T/C1,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 1
90.40
83.74
77.08
70.42
63.76
57.10
50.44
43.78
37.12
30.46
M
A
X
30:16:41:54
30:17:23:29
30:18: 5: 5
30:18:46:42
30:19:28:17
30:20: 9:54
1/91
CH 1: MIN= 33.40 AT 30:17:58:54
MAX= 92.30 AT 30:18:31:39

Figure 67.

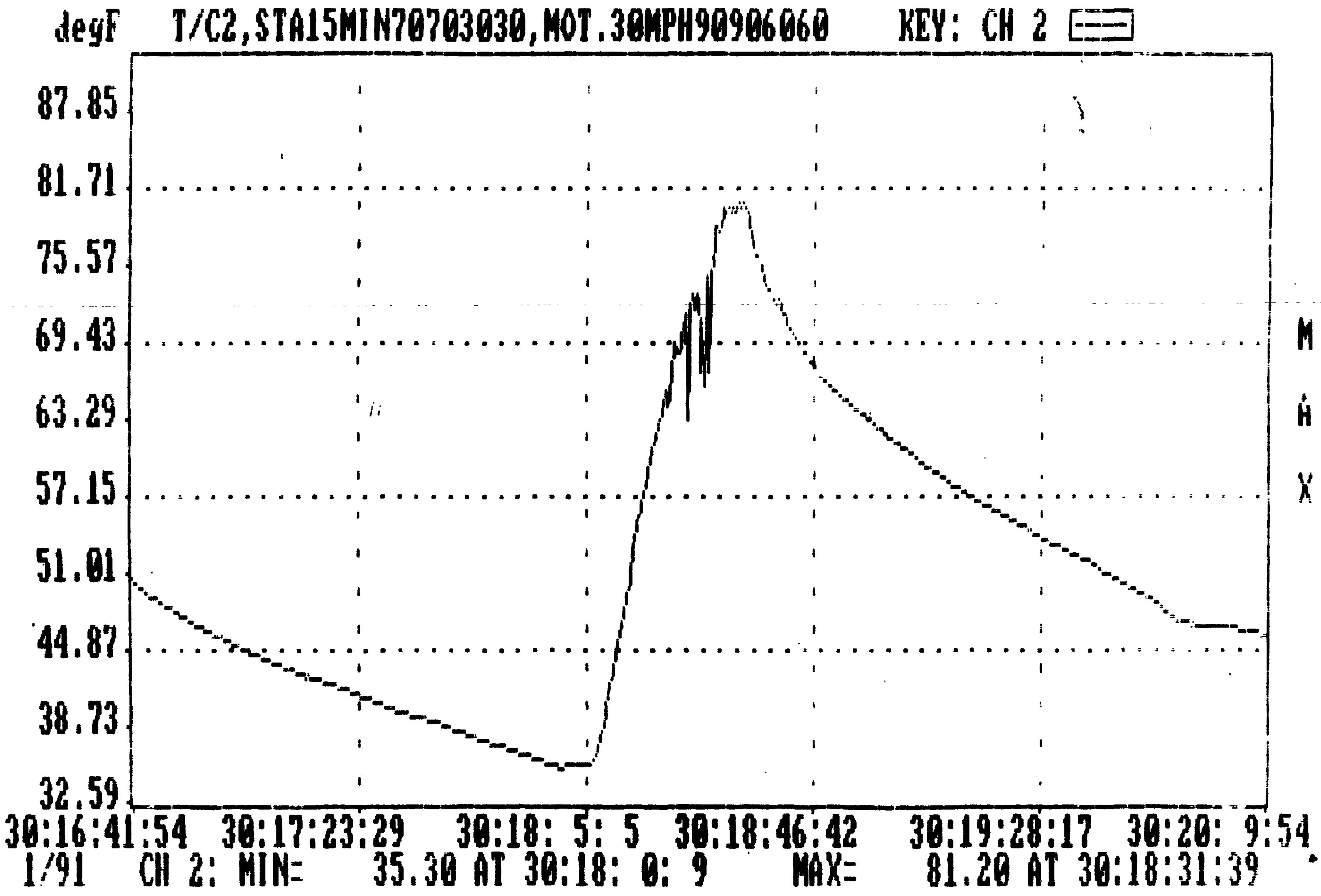

degF
T/C2,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 2
87.85
81.71
75.57
69.43
63.29
57.15
51.01
44.87
38.73
32.59
M
A
X
30:16:41:54
30:17:23:29
30:18: 5: 5
30:18:46:42
30:19:28:17
30:20: 9:54
1/91
CH 2: MIN= 35.30 AT 30:18: 0: 9
MAX= 81.20 AT 30:18:31:39

Figure 68.

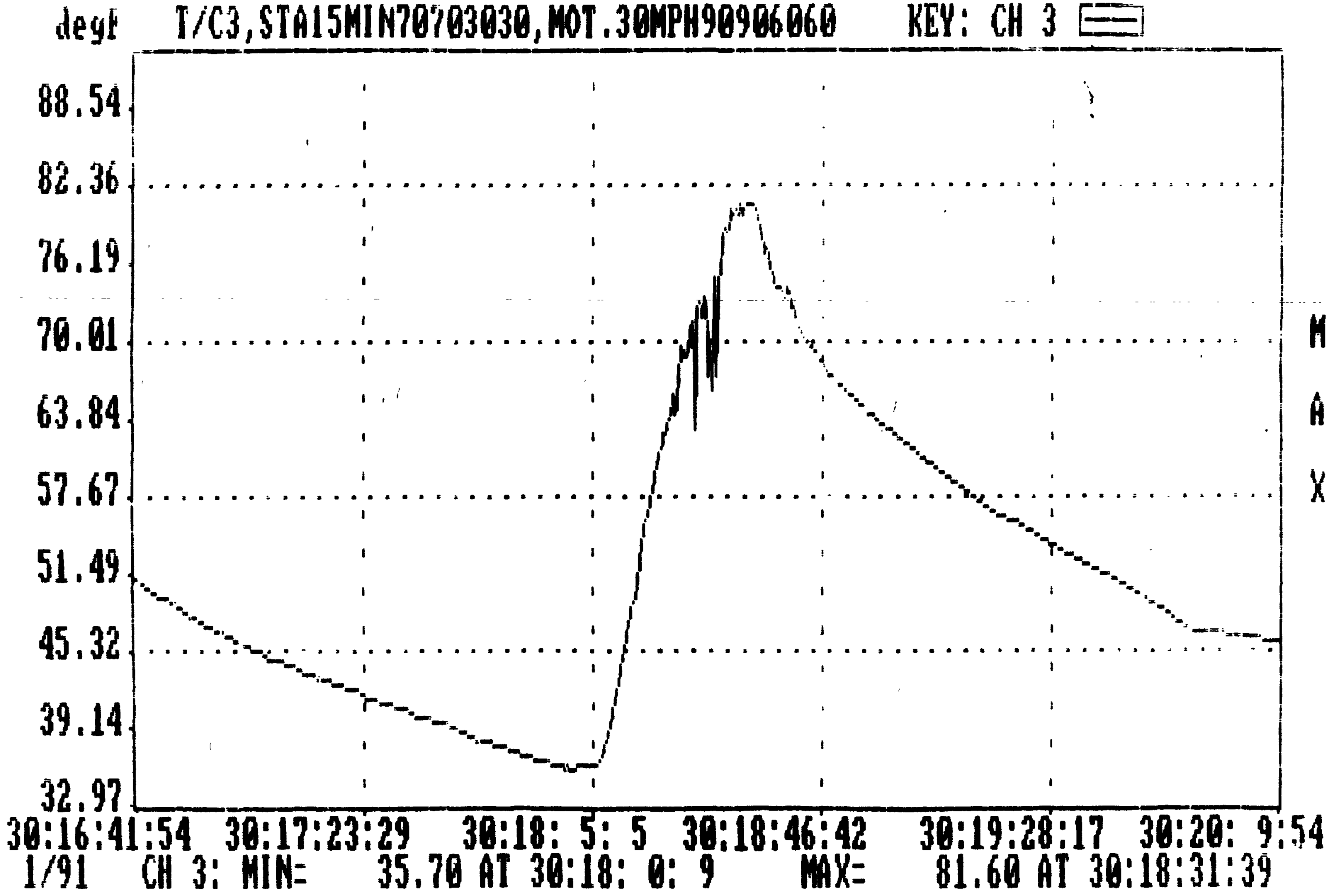

degF
T/C3,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 3
88.54
82.36
76.19
70.01
63.84
57.67
51.49
45.32
39.14
32.97
30:16:41:54
30:17:23:29
30:18: 5: 5
30:18:46:42
30:19:28:17
30:20: 9:54
1/91
CH 3: MIN= 35.70 AT 30:18: 0: 9
MAX= 81.60 AT 30:18:31:39
MAX

Figure 69.

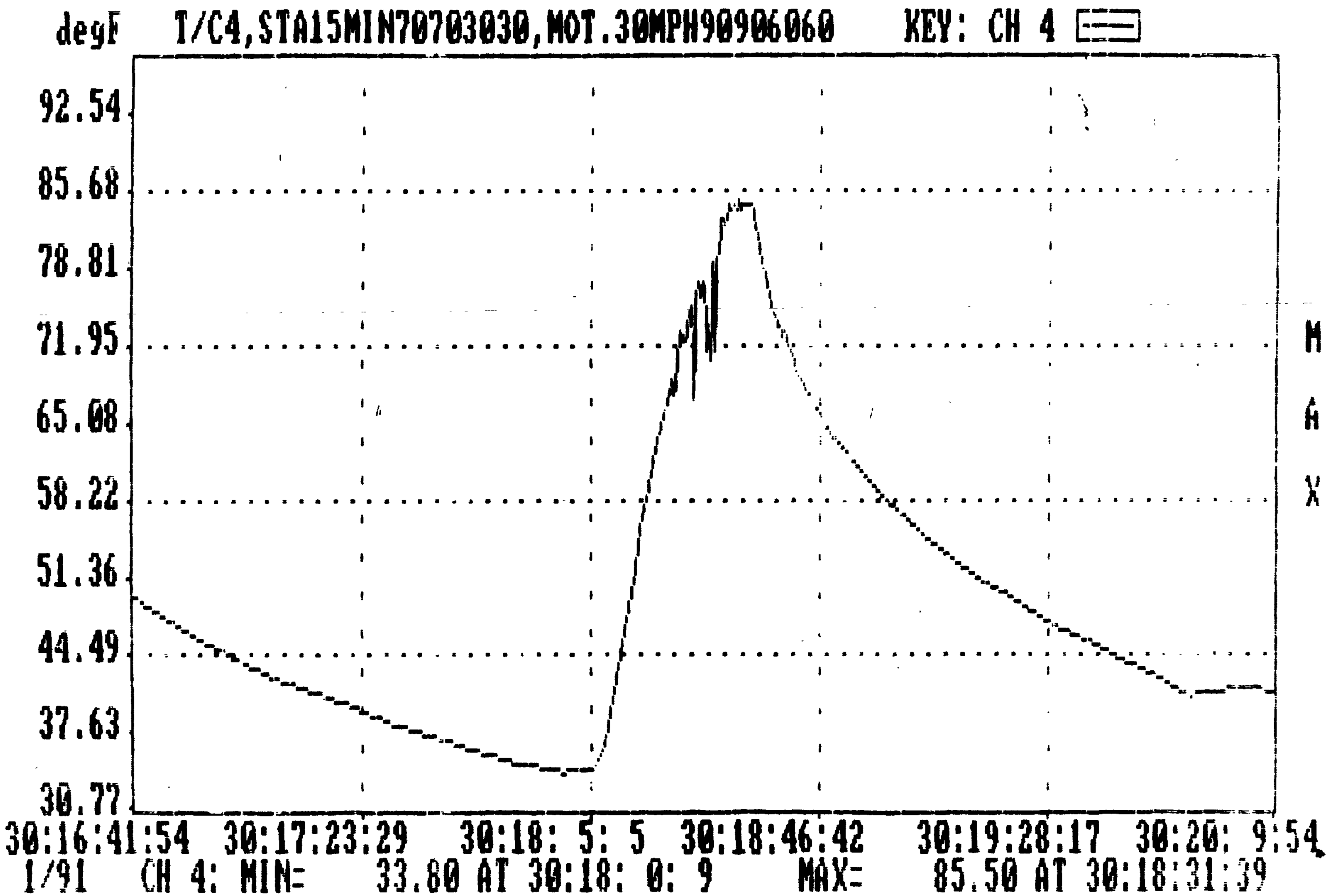

degF
T/C4,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 4
92.54
85.68
78.81
71.95
65.08
58.22
51.36
44.49
37.63
30.77
30:16:41:54
30:17:23:29
30:18: 5: 5
30:18:46:42
30:19:28:17
30:20: 9:54
1/91 CH 4: MIN= 33.80 AT 30:18: 0: 9 MAX= 85.50 AT 30:18:31:39
MAX

Figure 70.

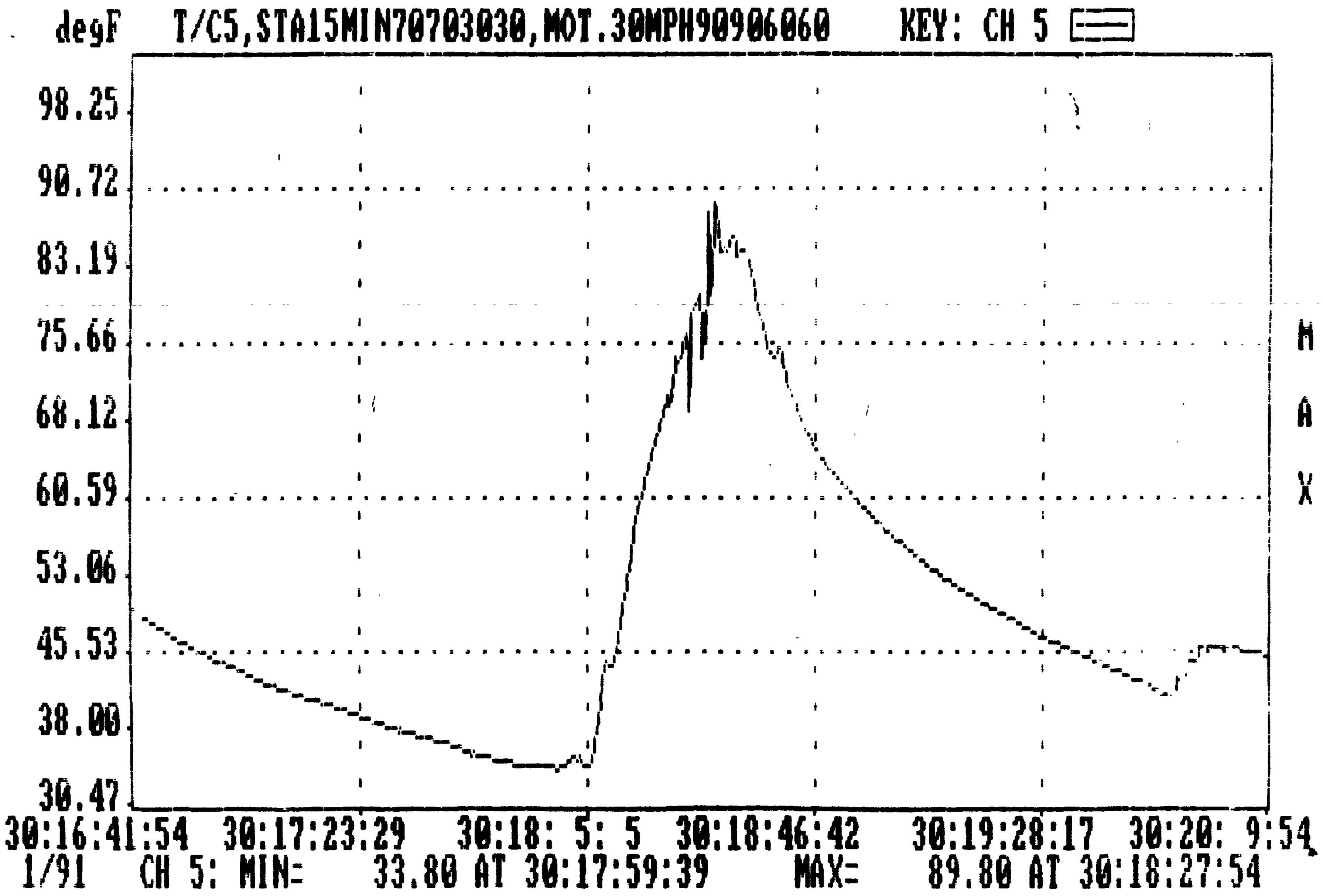

degF
T/C5,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 5
98.25
90.72
83.19
75.66
68.12
60.59
53.06
45.53
38.00
30.47
M
A
X
30:16:41:54
30:17:23:29
30:18: 5: 5
30:18:46:42
30:19:28:17
30:20: 9:54
1/91
CH 5: MIN= 33.80 AT 30:17:59:39
MAX= 89.80 AT 30:18:27:54

Figure 71.

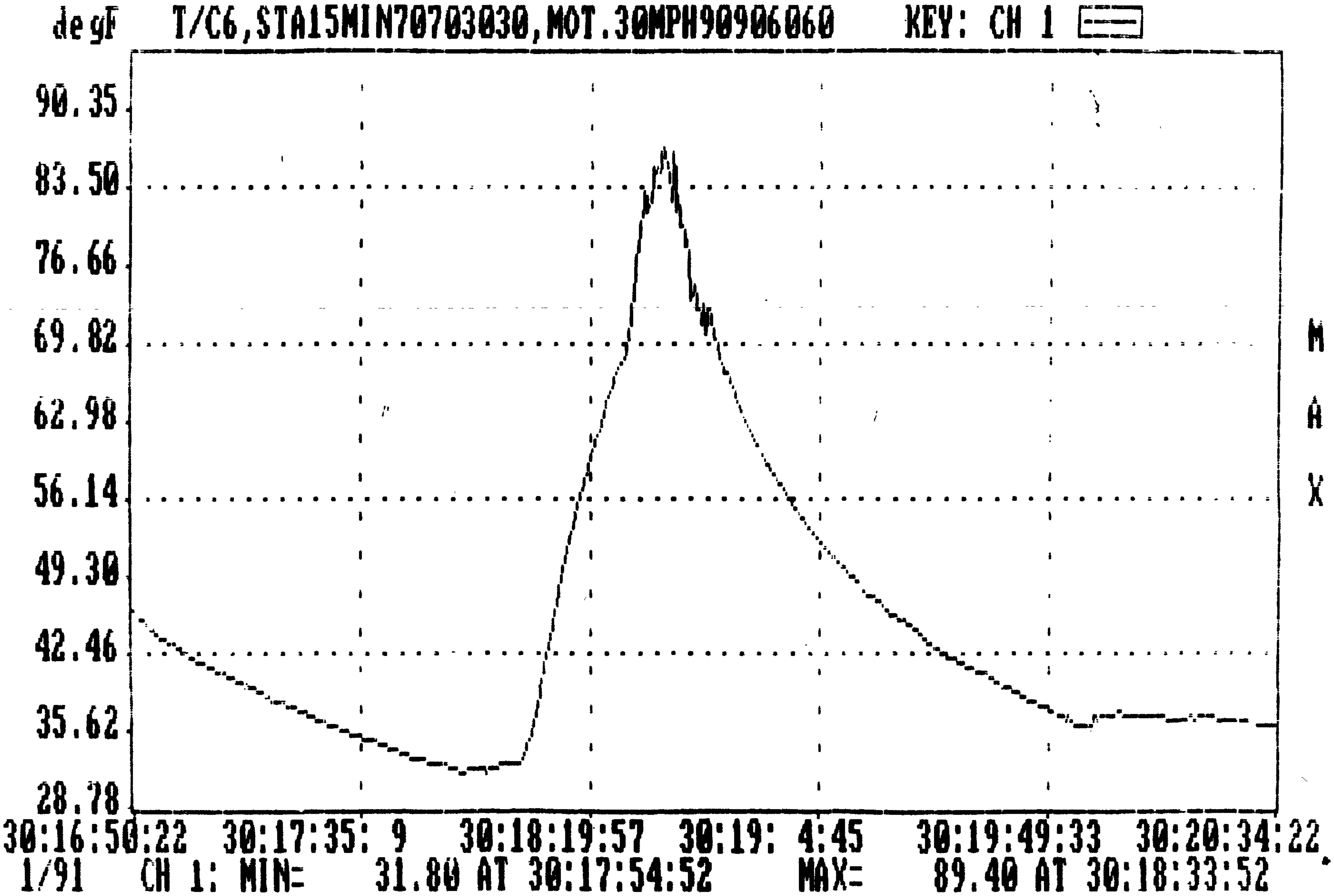


Figure 72.

IP12_002252

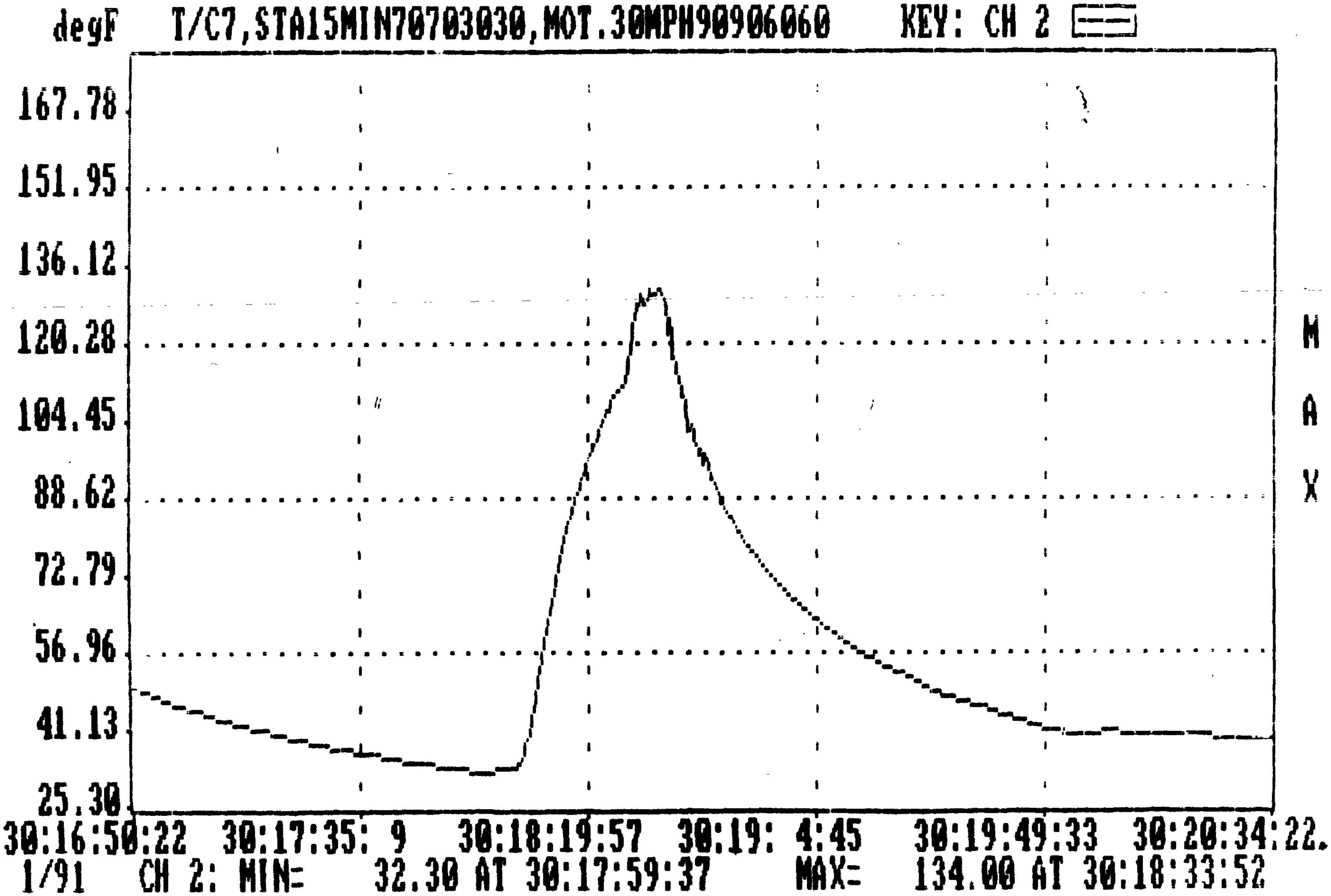


Figure 73.

IP12_002253

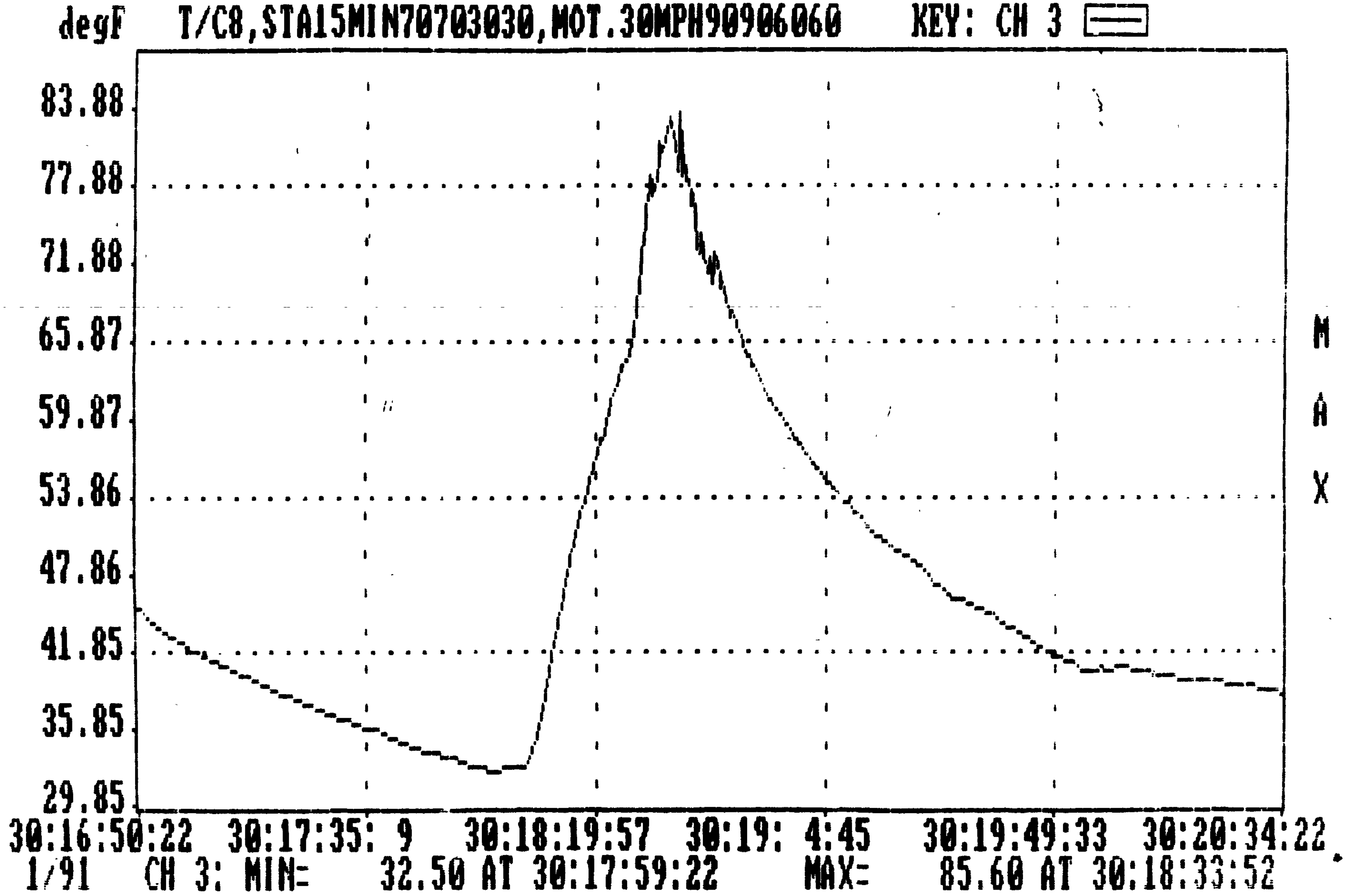

degF
T/C8,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 3
83.88
77.88
71.88
65.87
59.87
53.86
47.86
41.85
35.85
29.85
30:16:50:22
30:17:35: 9
30:18:19:57
30:19: 4:45
30:19:49:33
30:20:34:22
1/91
CH 3: MIN= 32.50 AT 30:17:59:22
MAX= 85.60 AT 30:18:33:52
MAX

Figure 74.

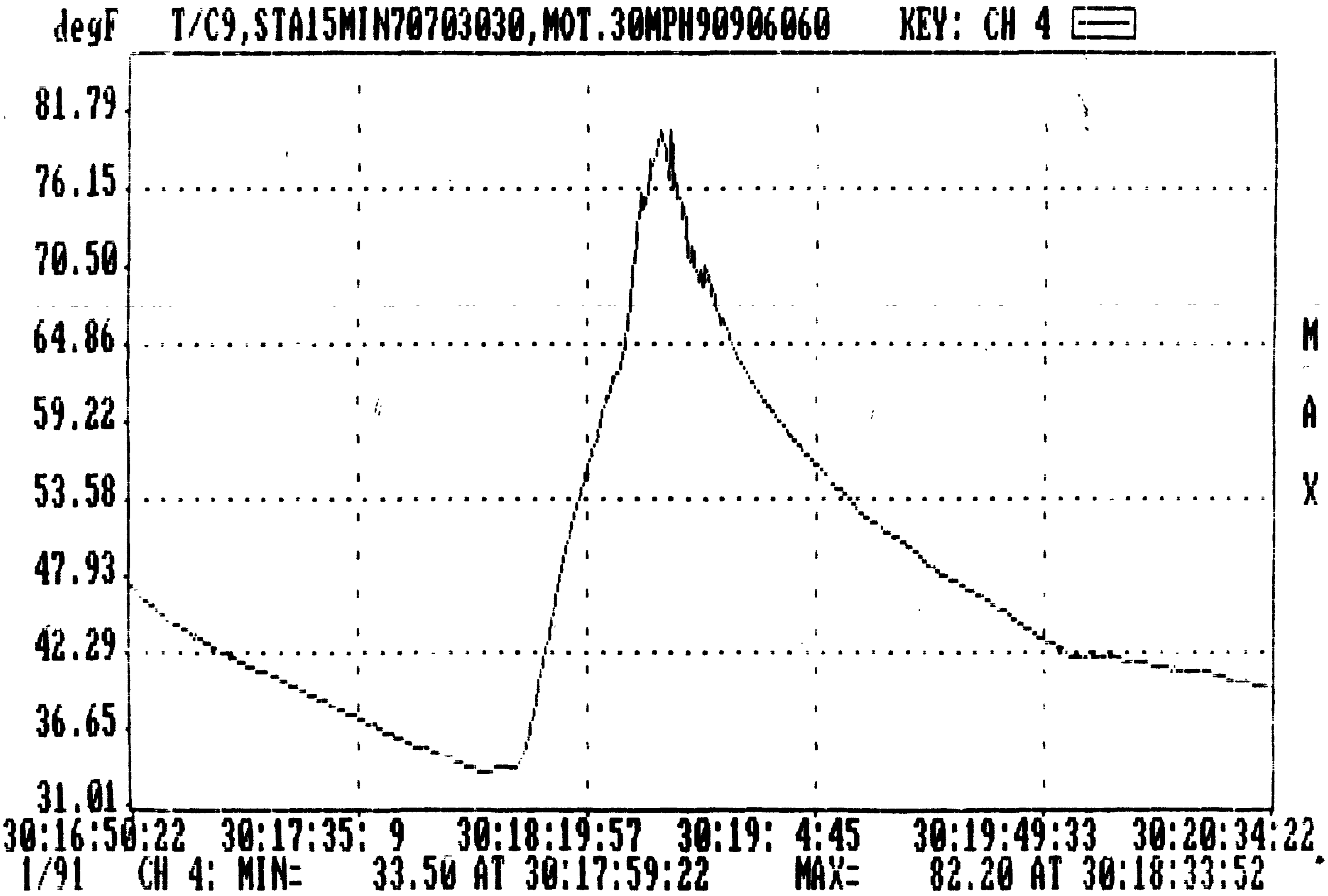


Figure 75.

IP12_002255

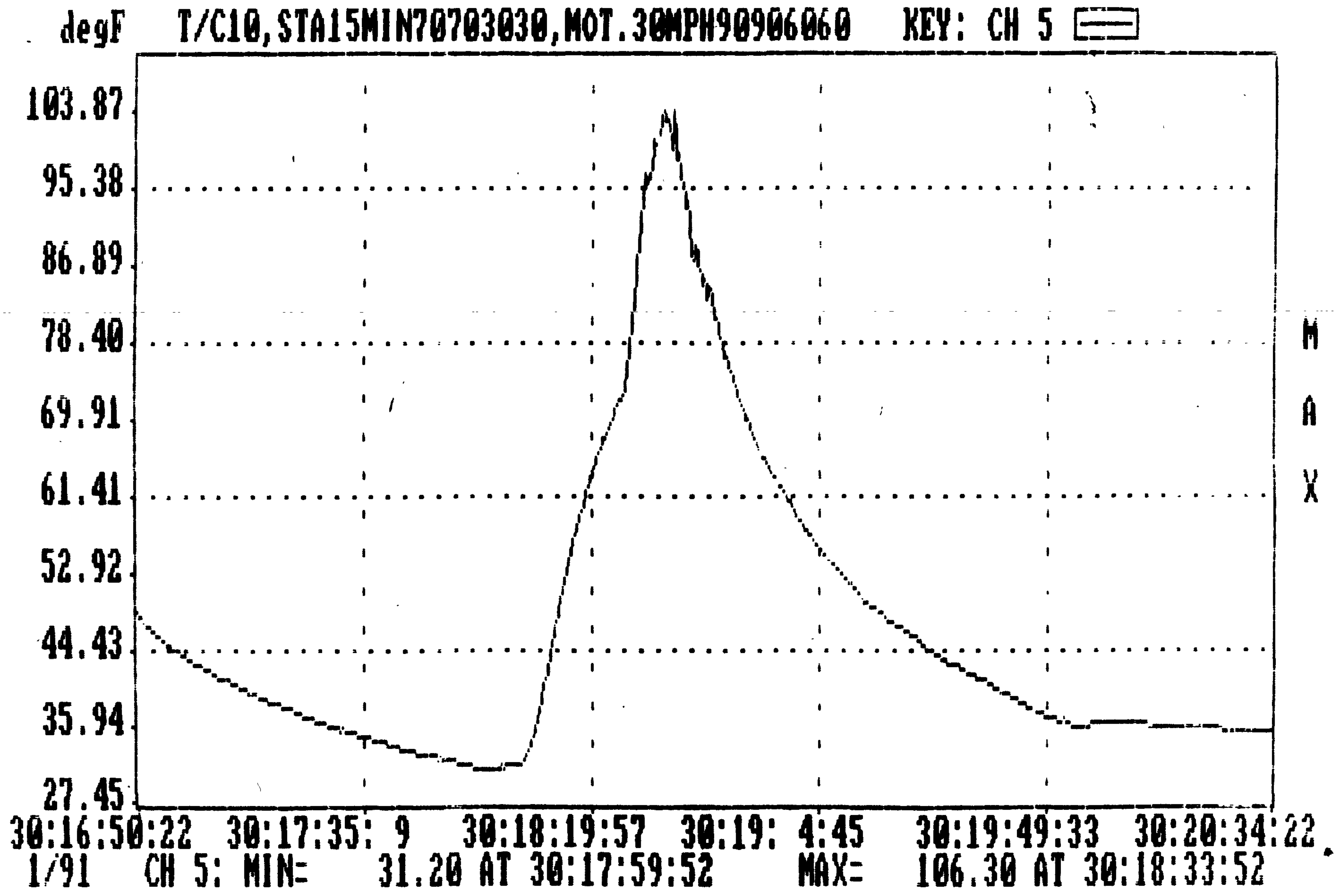

degF
T/C10,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 5
103.87
95.38
86.89
78.40
69.91
61.41
52.92
44.43
35.94
27.45
30:16:50:22
30:17:35: 9
30:18:19:57
30:19: 4:45
30:19:49:33
30:20:34:22
1/91
CH 5: MIN= 31.20 AT 30:17:59:52
MAX= 106.30 AT 30:18:33:52
M
A
X

Figure 76.

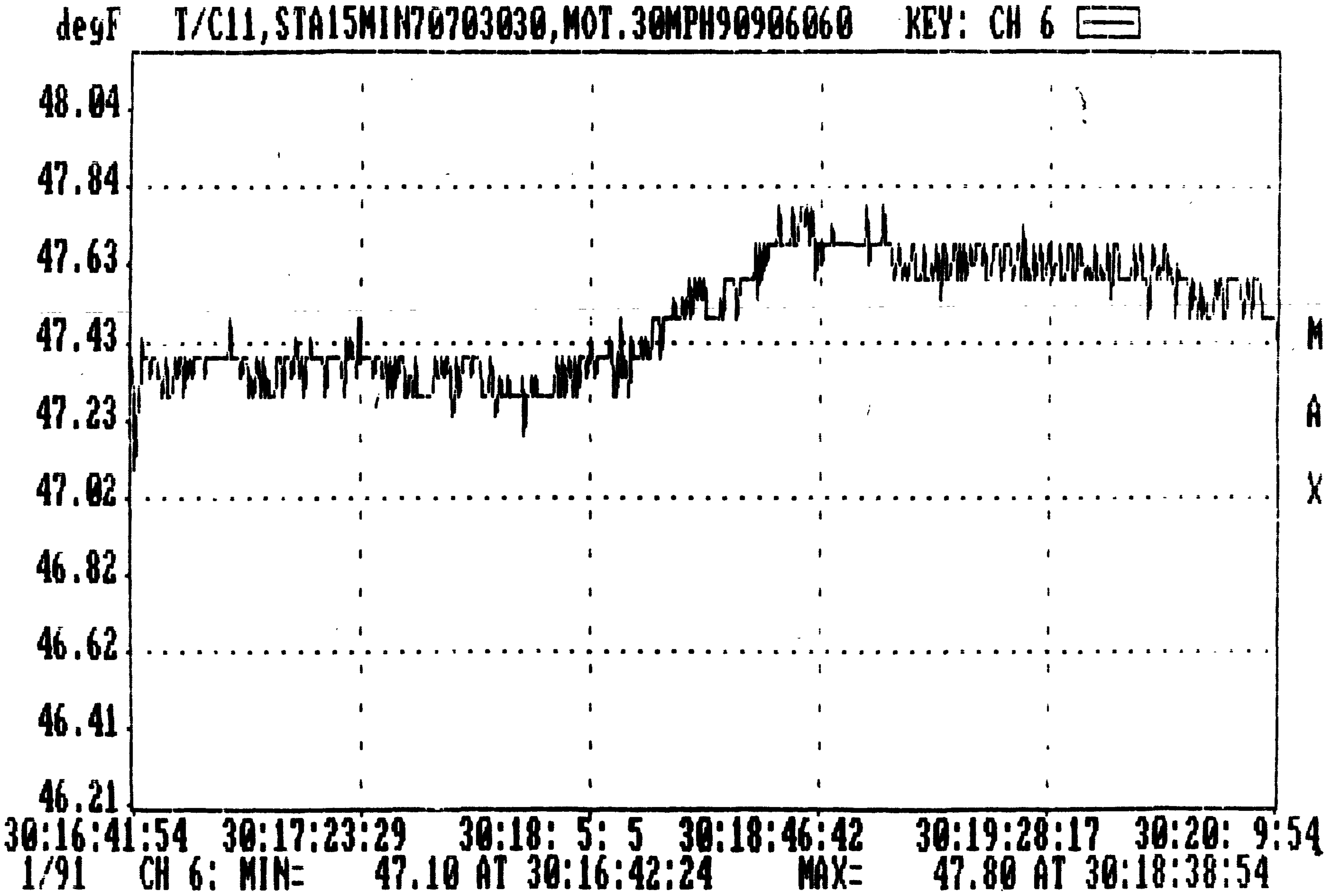

degF T/C11,STA15MIN70703030,MOT.30MPH90906060 KEY: CH 6
48.04
47.84
47.63
47.43
47.23
47.02
46.82
46.62
46.41
46.21
M
A
X
30:16:41:54 30:17:23:29 30:18: 5: 5 30:18:46:42 30:19:28:17 30:20: 9:54
1/91 CH 6: MIN= 47.10 AT 30:16:42:24 MAX= 47.80 AT 30:18:38:54

Figure 77.

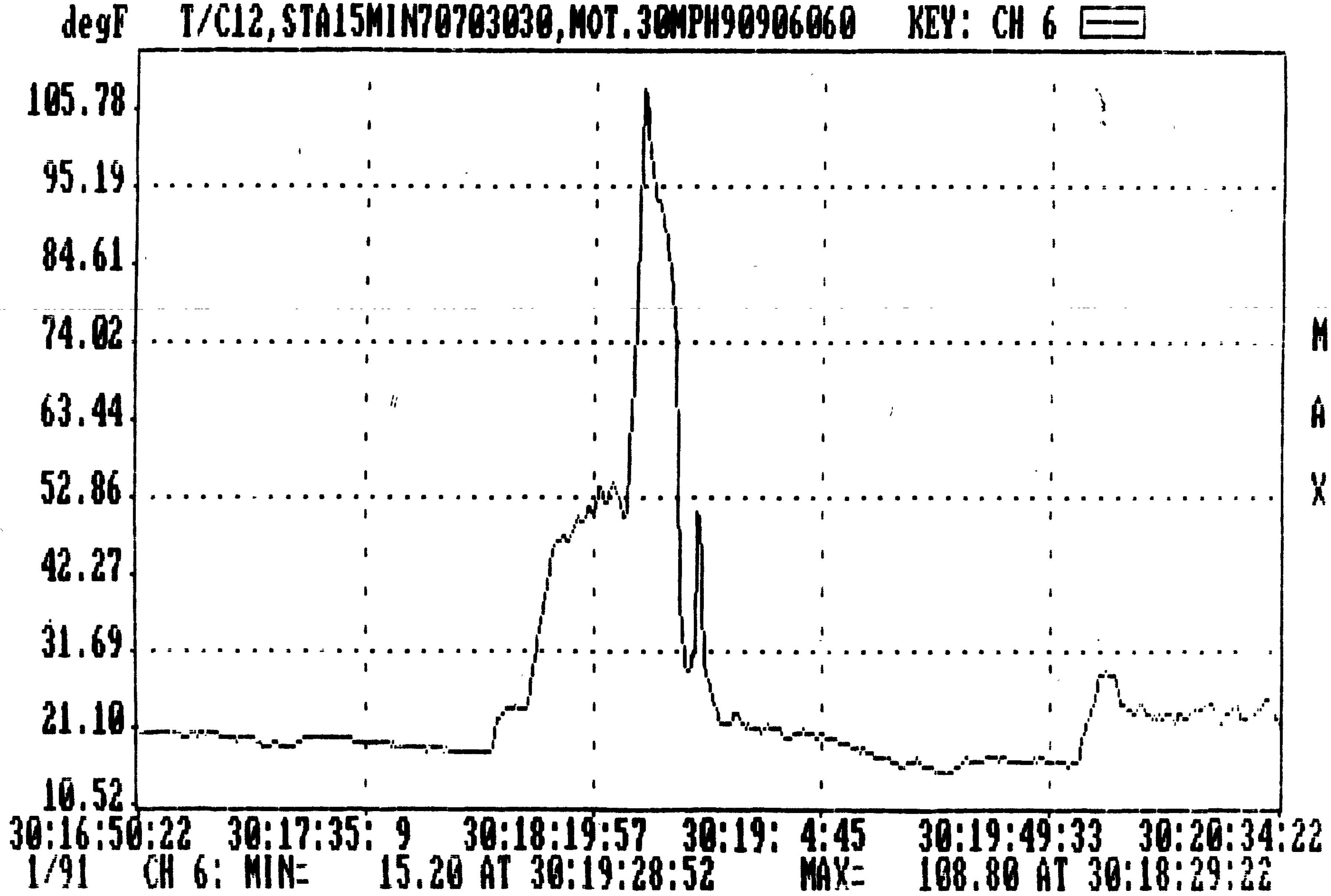


Figure 78.

97

IP12_002258

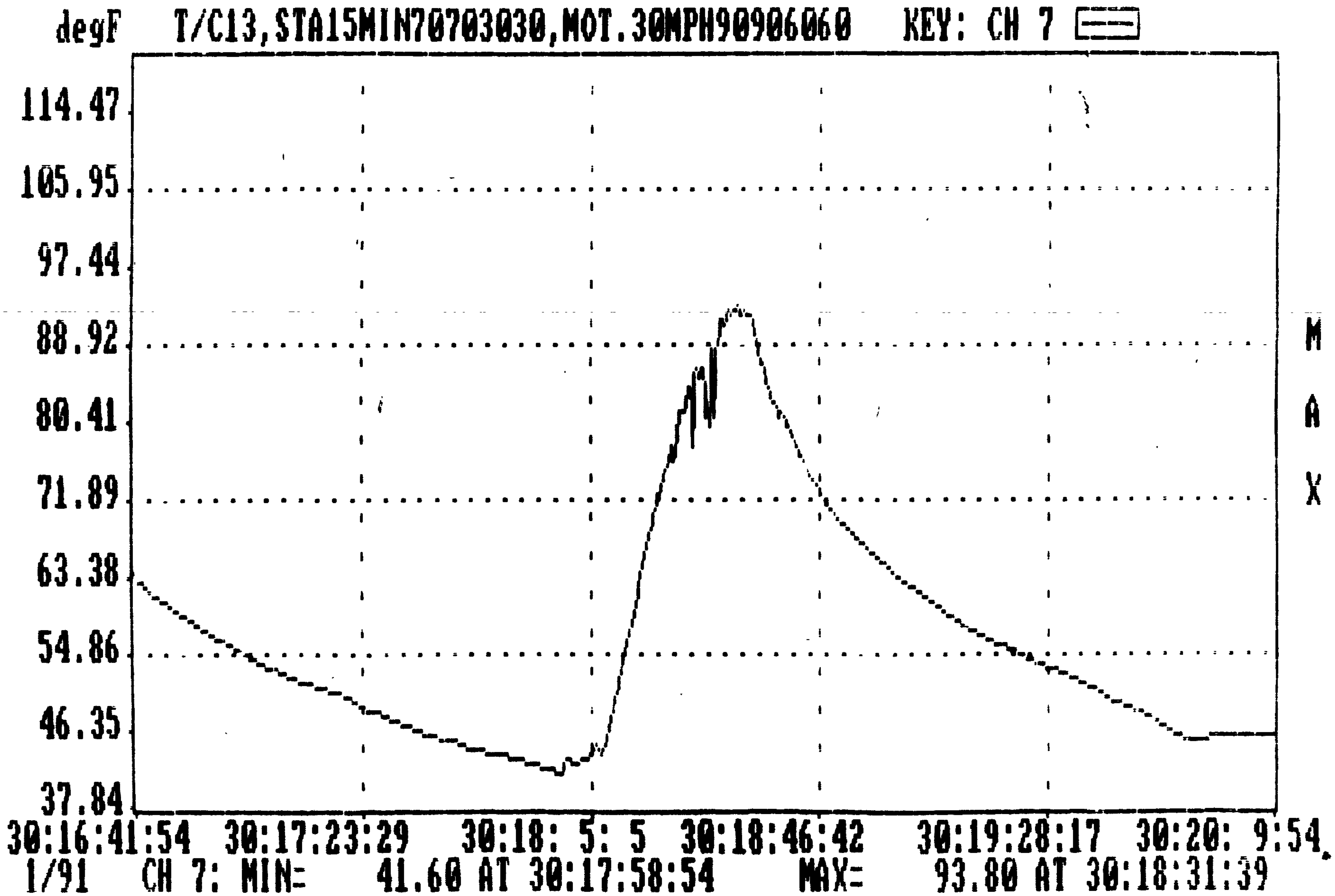

degF
T/C13,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 7
114.47
105.95
97.44
88.92
80.41
71.89
63.38
54.86
46.35
37.84
30:16:41:54
30:17:23:29
30:18: 5: 5
30:18:46:42
30:19:28:17
30:20: 9:54
1/91
CH 7: MIN= 41.60 AT 30:17:58:54
MAX= 93.80 AT 30:18:31:39
MAX

Figure 79.

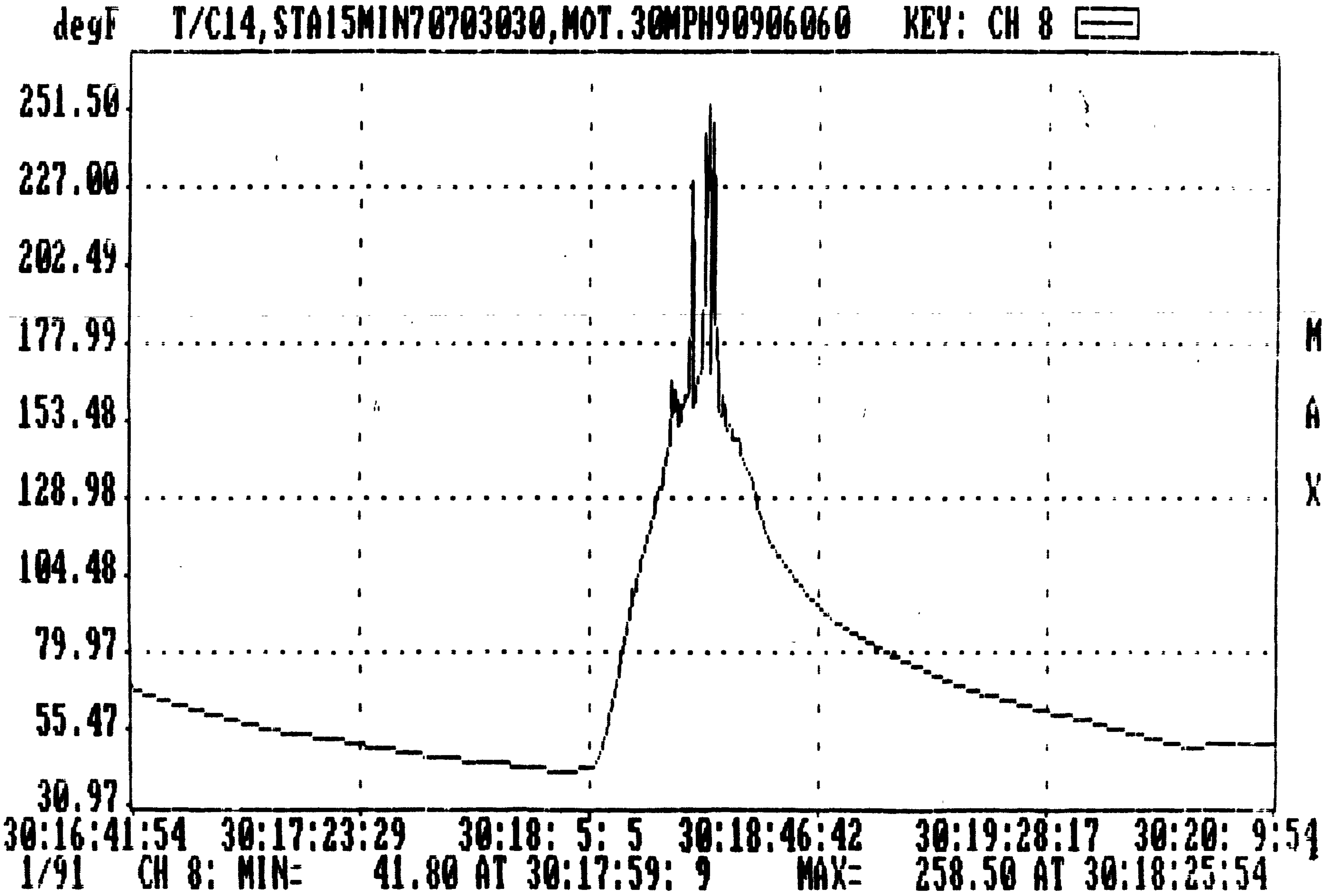

degF
T/C14,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 8
251.50
227.00
202.49
177.99
153.48
128.98
104.48
79.97
55.47
30.97
MAX
30:16:41:54
30:17:23:29
30:18: 5: 5
30:18:46:42
30:19:28:17
30:20: 9:54
1/91 CH 8: MIN= 41.80 AT 30:17:59: 9 MAX= 258.50 AT 30:18:25:54

Figure 80.

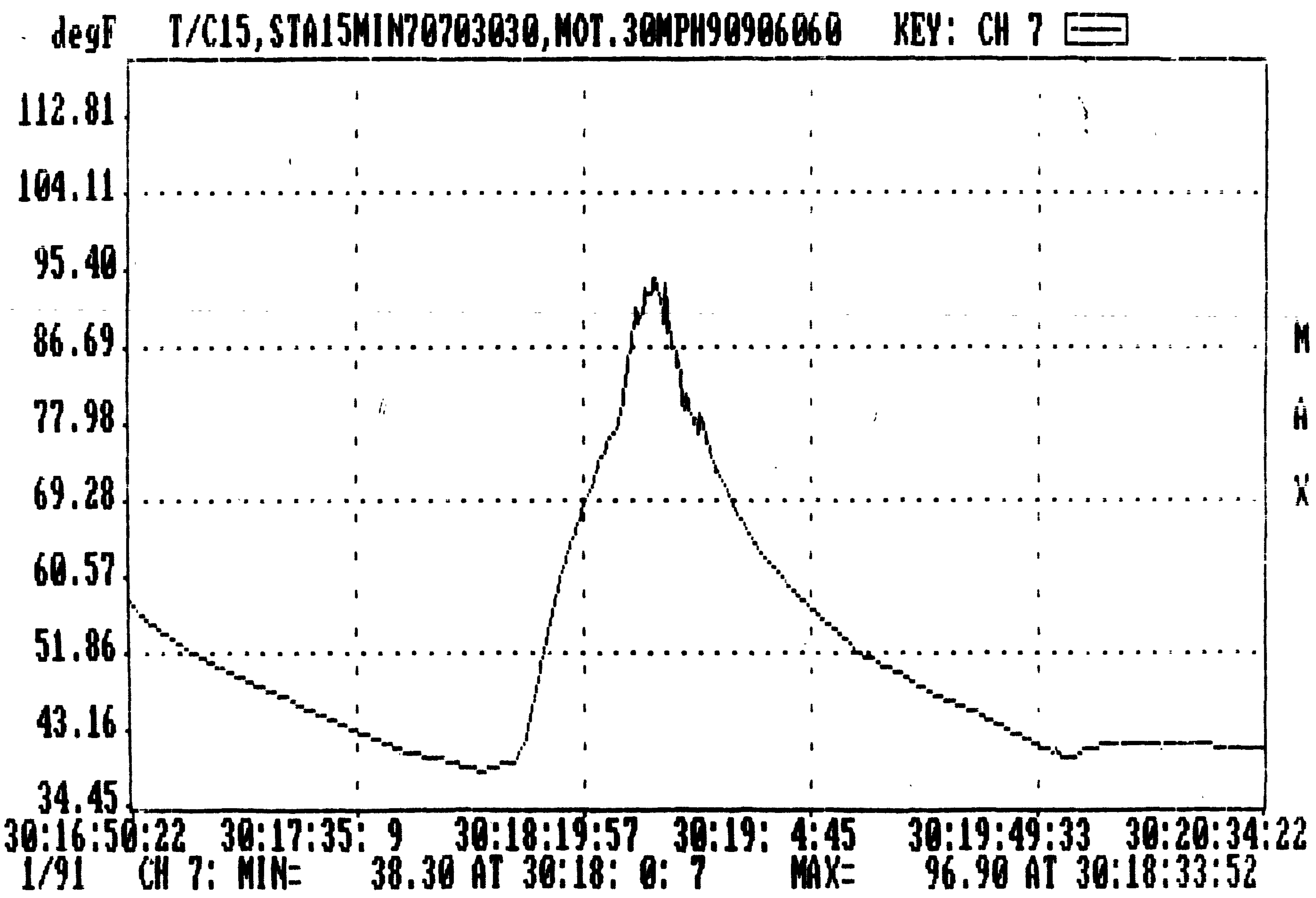
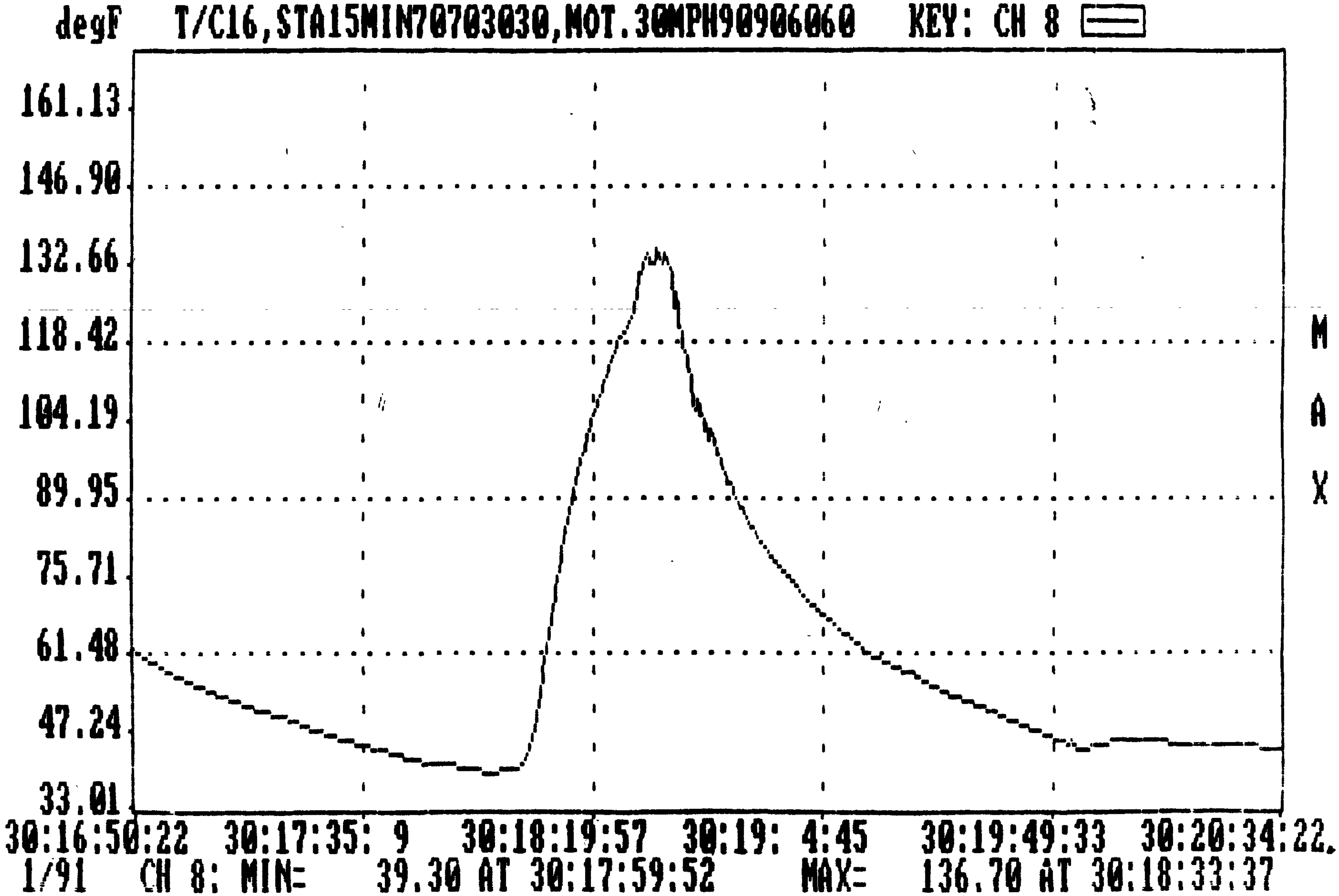


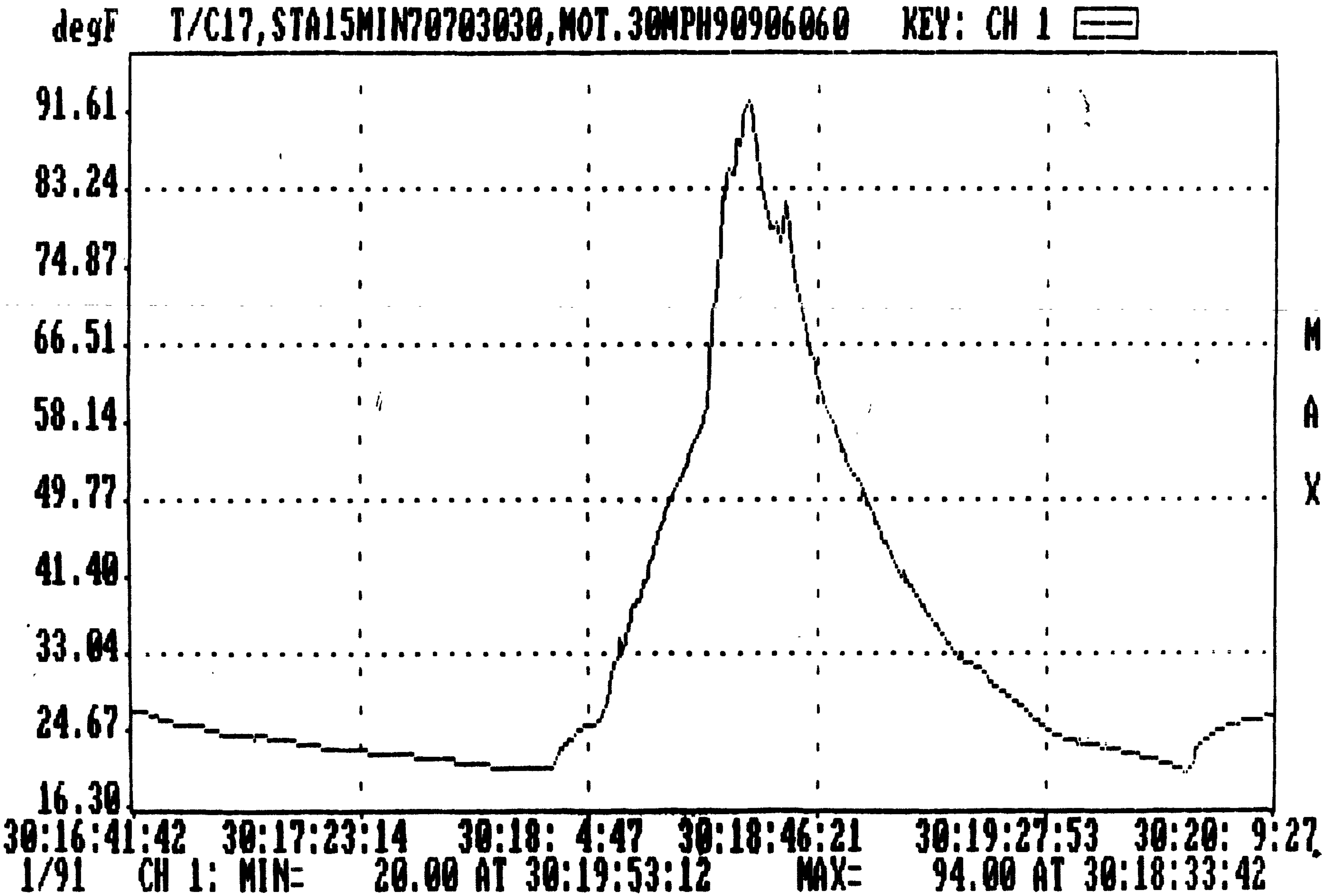
Figure 81.

IP12_002261



degF
T/C16,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 8
161.13
146.90
132.66
118.42
104.19
89.95
75.71
61.48
47.24
33.01
30:16:50:22
30:17:35: 9
30:18:19:57
30:19: 4:45
30:19:49:33
30:20:34:22.
1/91
CH 8: MIN= 39.30 AT 30:17:59:52
MAX= 136.70 AT 30:18:33:37
M
A
X

Figure 82.



degF
T/C17,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 1
91.61
83.24
74.87
66.51
58.14
49.77
41.40
33.04
24.67
16.30
M
A
X
30:16:41:42
30:17:23:14
30:18: 4:47
30:18:46:21
30:19:27:53
30:20: 9:27
1/91
CH 1: MIN= 20.00 AT 30:19:53:12
MAX= 94.00 AT 30:18:33:42

Figure 83

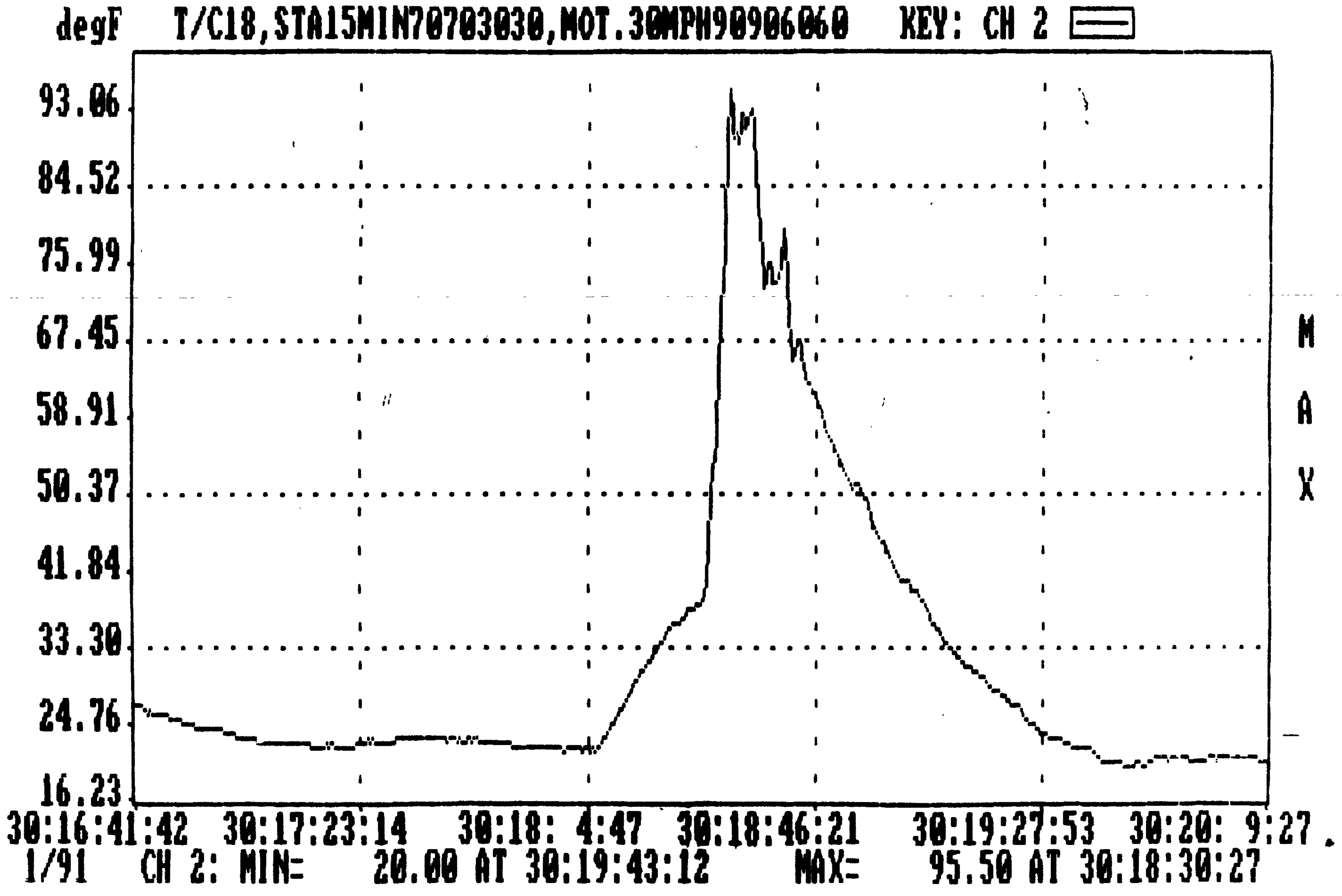

degF
T/C18,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 2
93.06
84.52
75.99
67.45
58.91
50.37
41.84
33.30
24.76
16.23
M
A
X
30:16:41:42
30:17:23:14
30:18: 4:47
30:18:46:21
30:19:27:53
30:20: 9:27
1/91
CH 2: MIN= 20.00 AT 30:19:43:12
MAX= 95.50 AT 30:18:30:27

Figure 84.

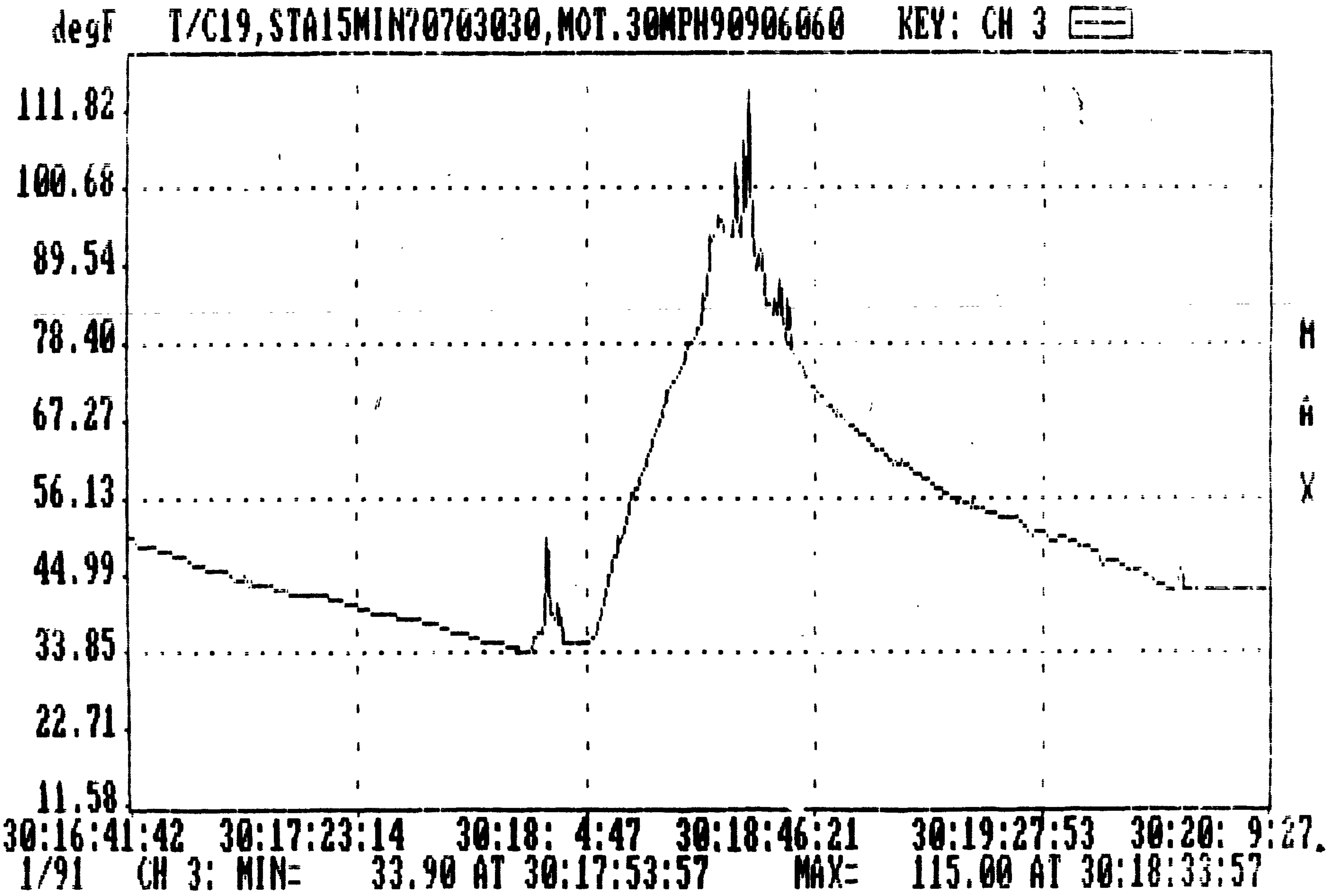

degF
T/C19,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 3
111.82
100.68
89.54
78.40
67.27
56.13
44.99
33.85
22.71
11.58
30:16:41:42
30:17:23:14
30:18: 4:47
30:18:46:21
30:19:27:53
30:20: 9:27.
1/91
CH 3: MIN= 33.90 AT 30:17:53:57
MAX= 115.00 AT 30:18:33:57
M
A
X

Figure 85.

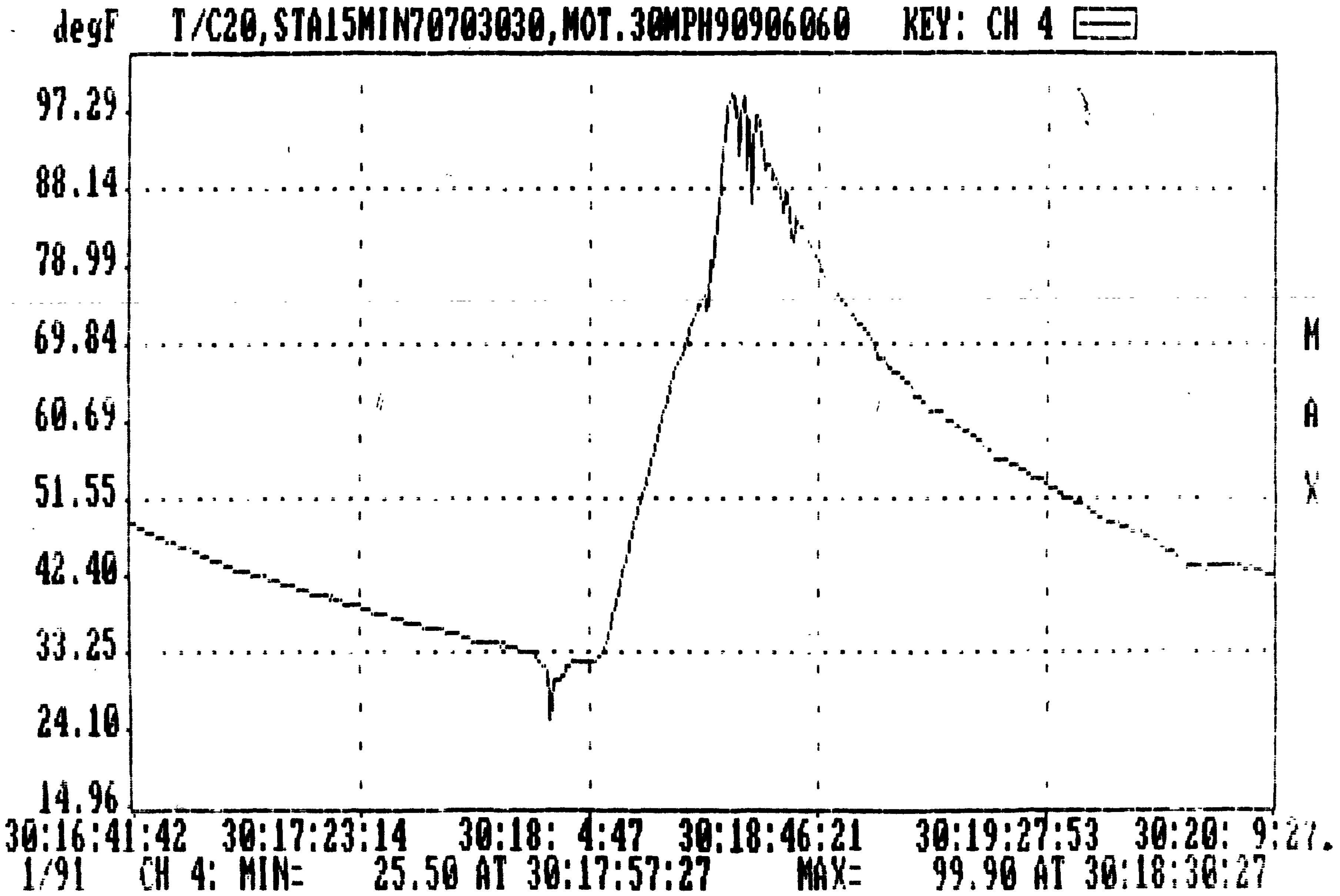

degF
T/C20,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 4
97.29
88.14
78.99
69.84
60.69
51.55
42.40
33.25
24.10
14.96
30:16:41:42
30:17:23:14
30:18: 4:47
30:18:46:21
30:19:27:53
30:20: 9:27.
1/91
CH 4: MIN= 25.50 AT 30:17:57:27
MAX= 99.90 AT 30:18:30:27
MAX

Figure 86.

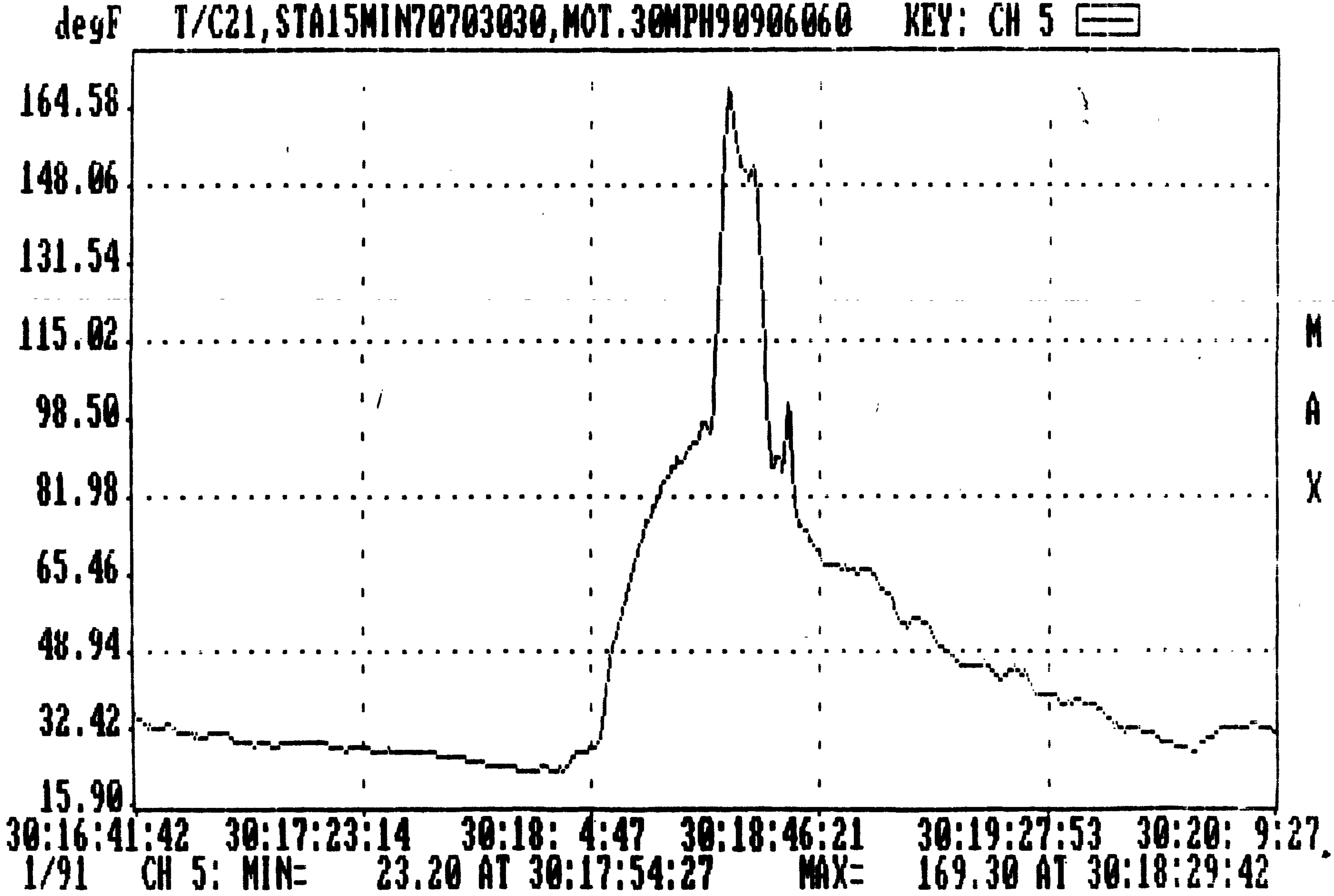

degF
T/C21,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 5
164.58
148.06
131.54
115.02
98.50
81.98
65.46
48.94
32.42
15.90
M
A
X
30:16:41:42
30:17:23:14
30:18: 4:47
30:18:46:21
30:19:27:53
30:20: 9:27
1/91
CH 5: MIN= 23.20 AT 30:17:54:27
MAX= 169.30 AT 30:18:29:42

Figure 87.

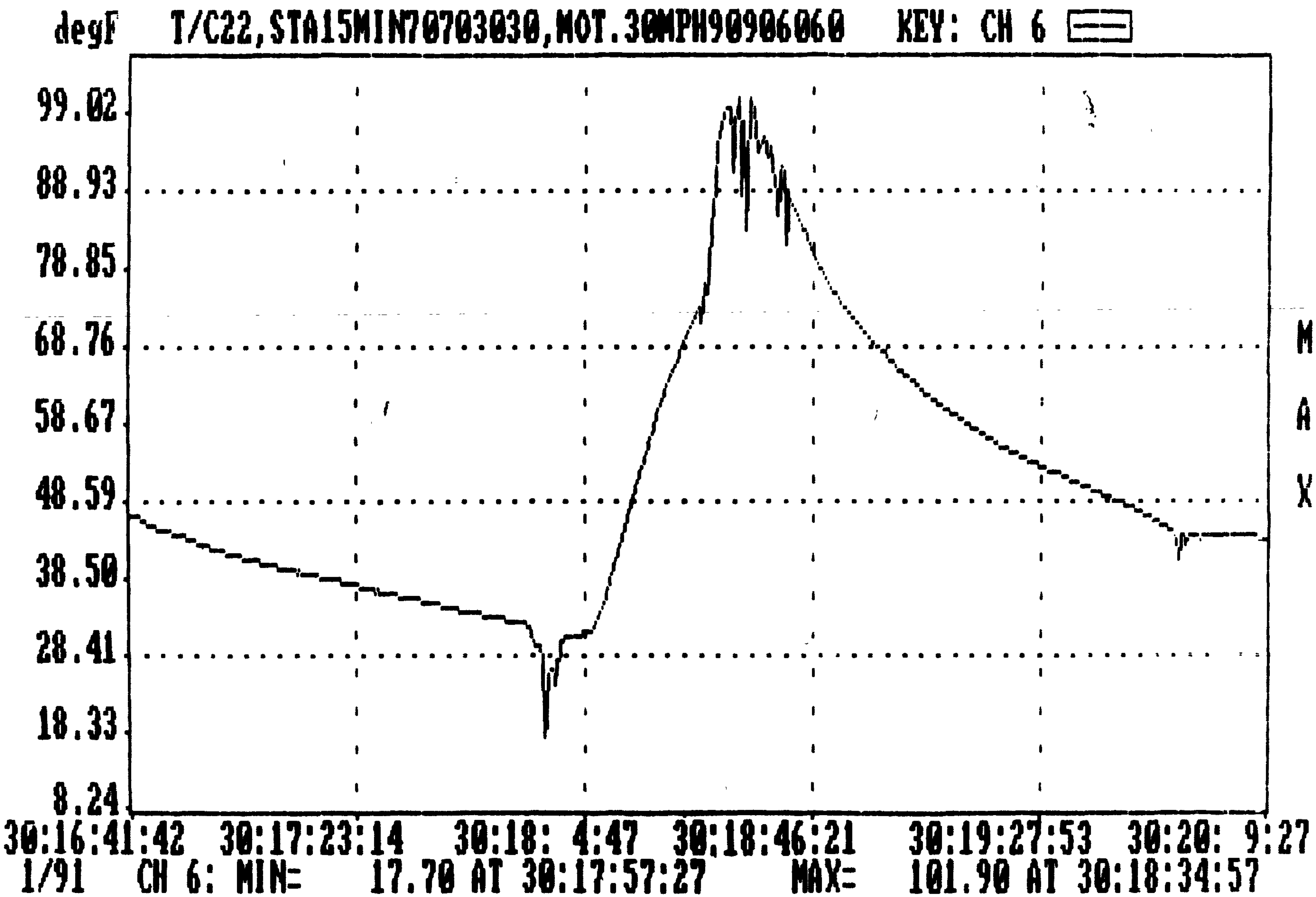

degF
T/C22,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 6
99.02
88.93
78.85
68.76
58.67
48.59
38.50
28.41
18.33
8.24
30:16:41:42
30:17:23:14
30:18: 4:47
30:18:46:21
30:19:27:53
30:20: 9:27
1/91
CH 6: MIN= 17.70 AT 30:17:57:27
MAX= 101.90 AT 30:18:34:57
MAX

Figure 88.

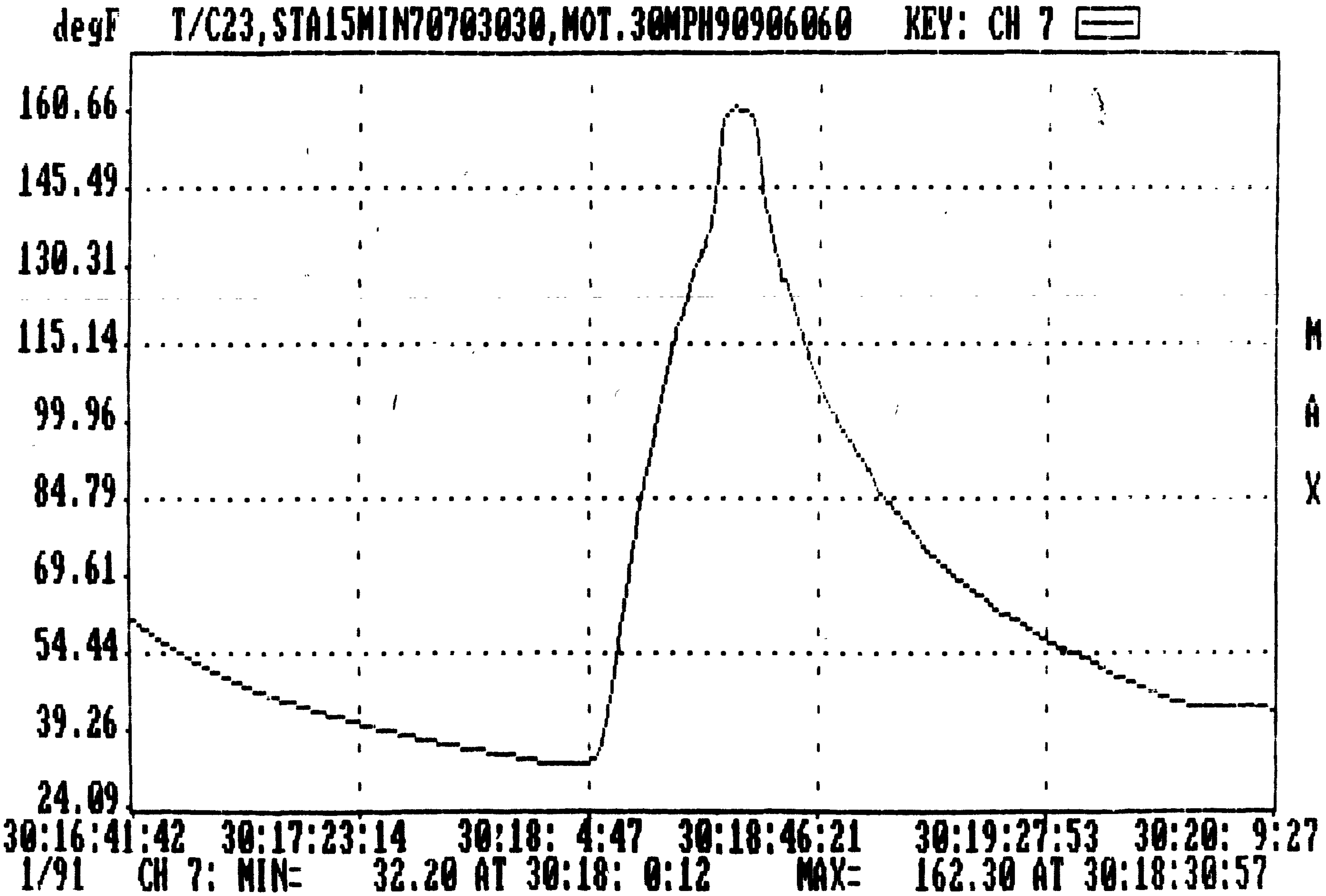

degF
T/C23,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 7
160.66
145.49
130.31
115.14
99.96
84.79
69.61
54.44
39.26
24.09
MAX
30:16:41:42
30:17:23:14
30:18: 4:47
30:18:46:21
30:19:27:53
30:20: 9:27
1/91
CH 7: MIN= 32.20 AT 30:18: 0:12 MAX= 162.30 AT 30:18:30:57

Figure 89.

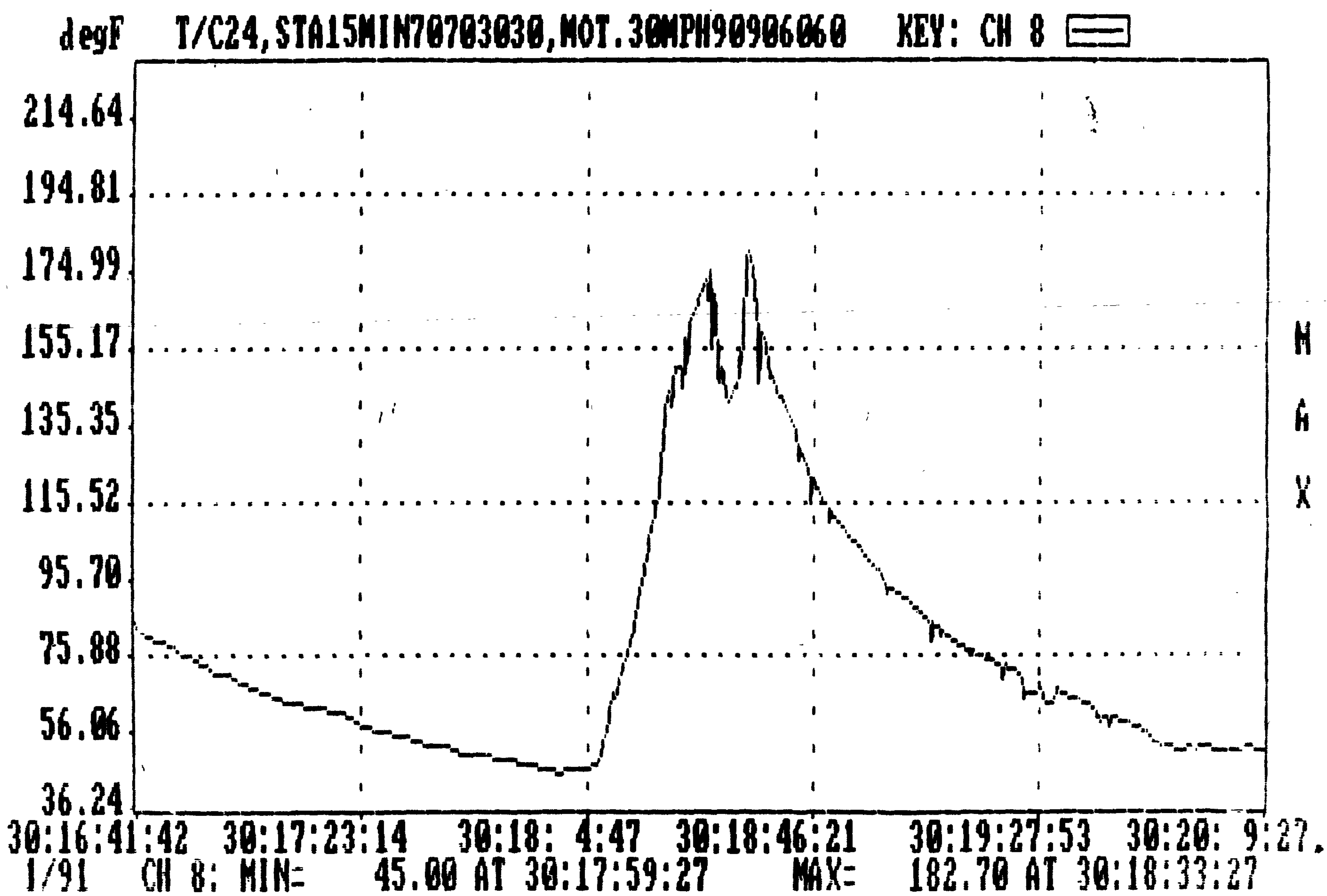

degF
T/C24,STA15MIN70703030,MOT.30MPH90906060
KEY: CH 8
214.64
194.81
174.99
155.17
135.35
115.52
95.70
75.88
56.06
36.24
30:16:41:42
30:17:23:14
30:18: 4:47
30:18:46:21
30:19:27:53
30:20: 9:27.
1/91
CH 8: MIN= 45.00 AT 30:17:59:27
MAX= 182.70 AT 30:18:33:27
MAX

Figure 90.